

M55 Junction 1 - Technical Note on Future Capacity Modelling Model 4 and 4a – December 2017

1.0 Introduction

Previous work by LCC in 2014/15 on the potential future capacity of the M55 junction, locally known as Broughton roundabout, identified a highway capacity problem that limits development proposals, including those in the Wyre district along the A6 corridor. The approach developed for decision making included the use of a Linsig signal model of the M55 J1 with support of a spreadsheet model for traffic redistribution.

Earlier this year the planning application for the Preston Western Distributor road which included a new motorway junction onto the M55 (J2) was submitted with supporting documents including an Environmental Statement (ES). The ES contained traffic information based on the output of a complex strategic traffic model of Central Lancashire (CLM), developed by LCC's framework consultants, Jacobs, using Saturn software.

The CLM provided the opportunity to investigate the '*strategic*' traffic impacts including redistribution (rerouting) as a result of changes to the network and or highway demand. This strategic model took a couple of years to build/validate and was not available for the earlier analysis. Changes modelled include:

- Preston Western Distributor and East West Link with a new junction 2 on the M55.
- Broughton by-pass with the provision of 4 south bound lanes to Broughton roundabout.
- Widening of both M55 junction 1 motorway (off) slip roads from 2 to 3 lanes.
- The provision of a new link road between D'Urton Lane and Eastway as part of the Story Homes development.

A note on the proportionate benefits of the above is included in Appendix G.

The future traffic flows were derived by assessing all the committed and pending development proposals in a large geographical area along with using information derived from the CLM. A prediction of flows through the junction for a 2026 scenario was calculated. A design year of 2026 is deemed a reasonable timeframe for development proposals and highway infrastructure to be built out.

The outputs from the strategic approach were used in the support modelling of Broughton Roundabout using propriety Linsig software, to test the future capacity of the junction with the changes in place as highlighted above.

Note: The associated table of development (Appendix E) impacting on the M55 J1 is to regularly updated (by LCC) having regard to the status of applications as well as regular updating of traffic flows and conditions.

This note sets out the methodology used to derive the future predicted traffic flows and then presents the results of the Linsig modelling work.

2.0 Future Traffic Prediction Methodology

This flow chart sets out the methodology used to calculate the assessment year traffic flow figures for the Linsig model. It is a combination of a manual approach for individual development sites combined with the use of the Saturn model to predict the rerouting effects of the new highway infrastructure.



3.0 Base Traffic Flows

An updated traffic survey was carried out at M55 junction 1 on 9th May 2016, recording all turning movements during the peak hours from all arms of the junction. The actual peak hour times surveyed was informed from a week long Automatic Traffic Counter close to the junction.

The validity of the survey data was checked against previous traffic data at the junction. Appendix B graph that show previous traffic count information.

4.0 Strategic Modelling

Jacobs were commissioned by LCC to assess the impact on M55 junction 1 of highway changes using the CLM. Two reports were produced (Appendix C and D). The first report assessed the changes that would arise due to the PWD and M55 junction 1 improvements. The second report then added on the new D'Urton Lane link road. Information from this work was then used to derive the changes to be applied to the base traffic flows patterns. It was also used to inform the distribution at the junction to and from individual development sites.

5.0 Background Traffic Growth

Background traffic growth using TEMPRO 7 was required in order to account for the numerous small developments that were under the threshold for the submission of either a Traffic Assessment or the simpler Traffic Statement and therefore were not added independently to the final analysis figures. These include ones listed in the table in Appendix E and single residential units that were too numerous to be identified individually.

An approach to negate against double counting in the TEMPRO factors was applied by using "Alternative Assumptions". TEMPRO 7 groups areas into Middle Super Output Areas (MSOA) and to be able to reduce the full amount of background growth, the full Preston area had to be used. The Preston002 MSOA, where M55 J1 is located, had insufficient new households to discount the full figure of 8081 dwellings.

2016 – 2026 TEMPRO Growth

AM growth	1.0999
PM growth	1.0938

6.0 Development Sites

A list of individual developments that would generate a traffic impact upon M55 Junction 1 was drawn up from committed, pending and proposed residential developments within Preston, Wyre and Ribble Valley. These were from applications consulted on by LCC highways and additional sites on the Local Planning Authority websites and local plan information. These are shown in Appendix E. For models including Model 4 and beyond, the list now excludes sites refused prior to December 2017.

Where submitted, a TA or TS was obtained from the LPA website and the distribution of development traffic provided in this document was used to obtain numbers of development vehicles expected to pass through M55 junction 1. This traffic was then re-distributed according to percentage

factors obtained from Jacobs' SATURN modelling results in order to allow for the influence of both PWD/EW Link Road and the D'Urton Link upon the future year traffic flows.

To simplify the modelling a number of the smaller proposals are excluded from a specific distribution, it was assumed that these smaller proposals for the purpose of this exercise could be included within the background growth figures. LCC does not assume that all small applications fall into this category and can be excluded.

The base flows, Jacobs' redistributed flows and the individual development traffic flows were then summated in order to produce a final estimation of the future flows expected through the junction after all road changes had been implemented and all development built out. These figures were then used for the Linsig capacity modelling of the signalised junction.

7.0 Local Junction Modelling

The local junction modelling software Linsig was used to assess the improved Broughton roundabout. These improvements provide 3 lanes each on the motorway (off) slip roads and also included 4 lane approaches on the A6. A high capacity junction is therefore modelled.

The geometrical inputs to derive the saturation flows were taken from the design drawings. JCT are the suppliers of the propriety software Linsig and their recommended approach to modelling signalled roundabout was followed. This is an iterative approach of maximising the degree of saturation on the approach arms, then adjusting the off-sets to aim to cater for internal circulatory queuing. Appendix F presents the Linsig modelling outputs which shows that the junction is predicted to operate at the limit of its capacity when providing for the predicted flows in 2026.

It should be noted that the Linsig analysis was done as an isolated model and doesn't take into account the influence of or any impacts upon nearby junctions along the A6 corridor. Some supplementary junctions have been considered on the D'Urton Lane route, they also would be operating at their limiting capacity.

8.0 Modelling Summary

The Linsig modelling demonstrates that the M55 J1 in isolation is predicted to operate at the limit of its theoretical capacity when providing for the predicted future flows with development that has been assessed. This assumes that all provision as identified is delivered and that the traffic growth is not exceeded.

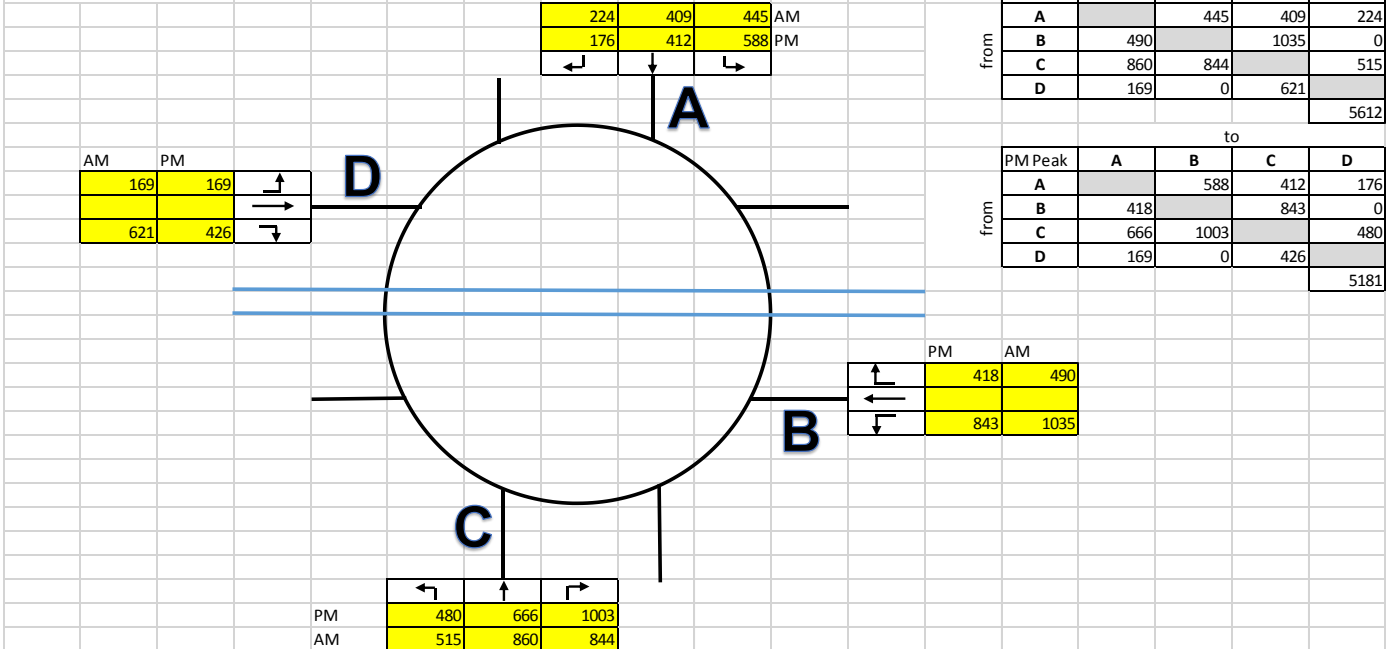
APPENDIX A – Traffic Flows

Appendix Ai

2016 Base Year Survey (9th May)

AM - 07:30 to 08:30

PM - 16:00 - 17:00

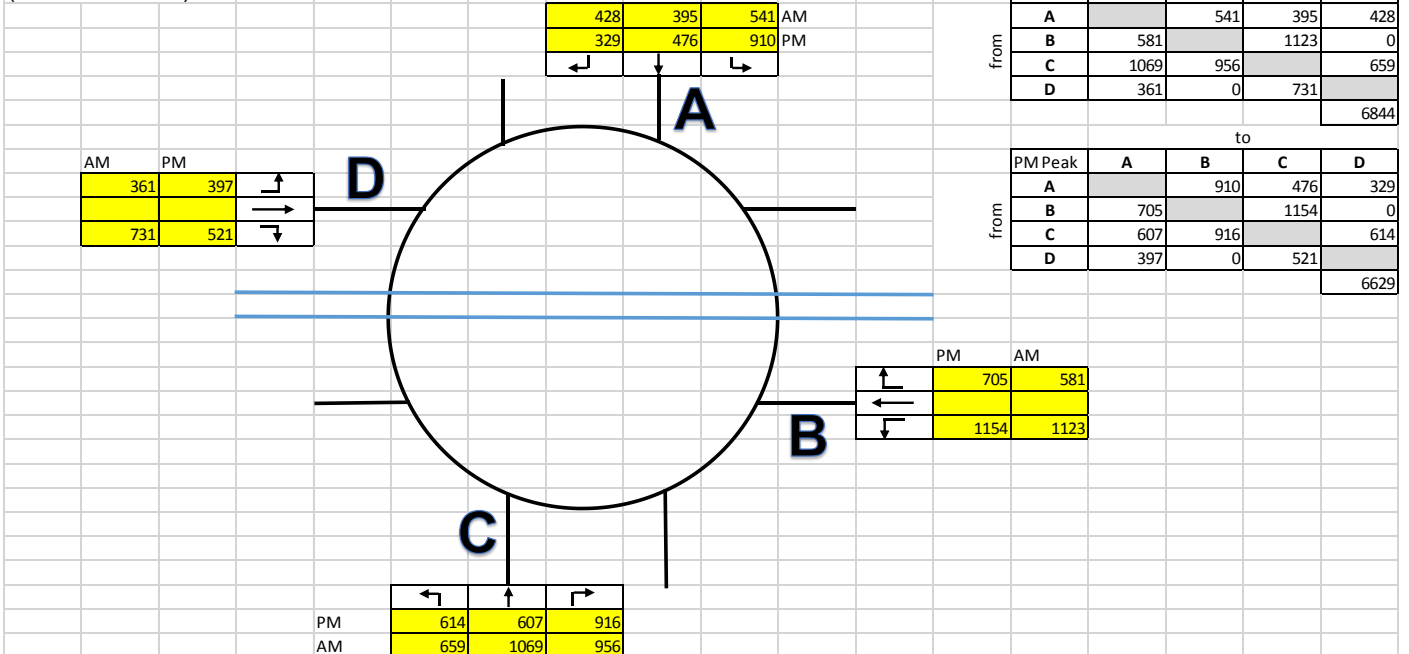


Appendix Aii

MODEL 4 Cumulative Total 2026

Assessment Flows

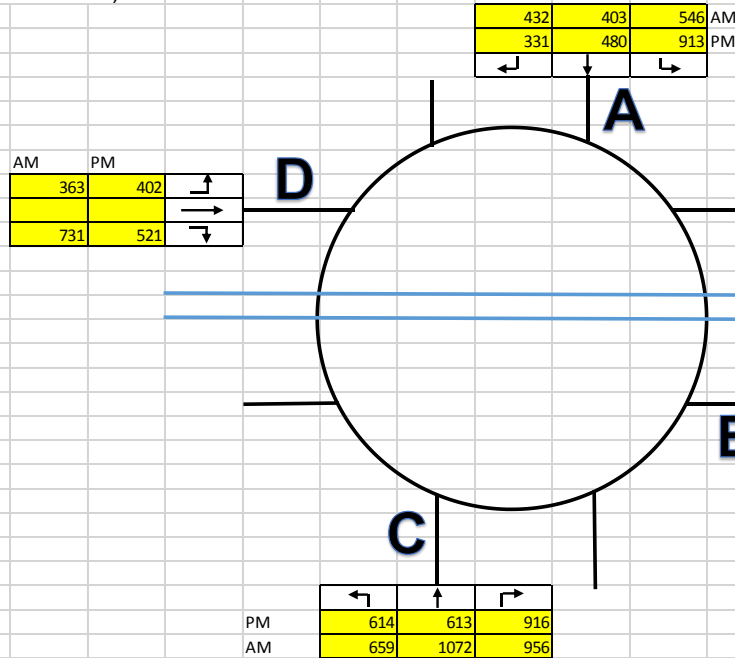
(with D'Urton Link)



Appendix Aiii

MODEL 4a Cumulative Total 2026

Assessment Flows
(with D'Urton Link)

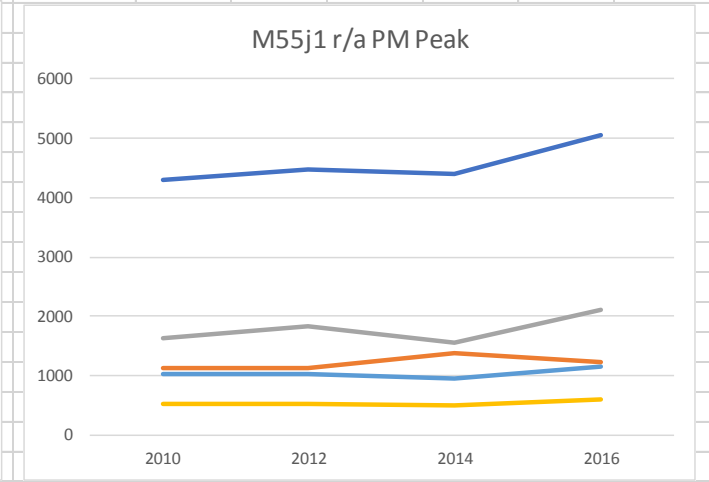
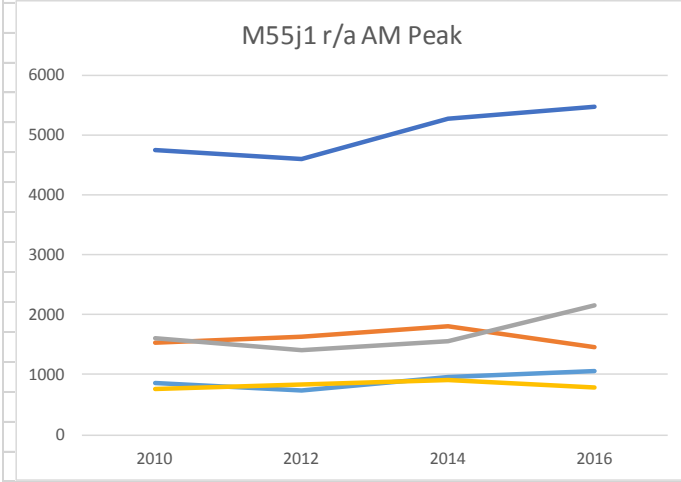


		to			
from	AM Peak	A	B	C	D
A			546	403	432
B		584		1123	0
C		1072	956		659
D		363	0	731	
					6869

		to			
from	PM Peak	A	B	C	D
A			913	480	331
B		715		1154	0
C		613	916		614
D		402	0	521	
					6659

APPENDIX B – Traffic Flow Comparison Graphs

entry flows									
07:30 - 08:30	2010	2012	2014	2016	16:00 - 17:00	2010	2012	2014	2016
A6 n	870	741	970	1052	A6 n	1019	1010	954	1144
M55 e	1527	1624	1822	1468	M55 e	1135	1134	1379	1214
A6 s	1607	1406	1564	2169	A6 s	1626	1817	1562	2118
M55 w	757	833	908	778	M55 w	514	515	495	584
total	4761	4604	5264	5467	total	4294	4476	4390	5060



APPENDIX C – Jacobs Modelling Note (PWD)

Date 22 September 2016
From Leighton Cardwell (Jacobs) , Sergey Makov (Jacobs), Masoumeh Rajabi (Jacobs)
Subject M55 J1- 2026 Turning Movements- Implications of the PWD Scheme
Copies to Lancashire County Council

Introduction

This Technical Note has been produced by Jacobs to summarise the impacts of the Preston Western Distributor Scheme (PWD) on traffic demand of the M55 J1.

This is informed by the assessments Jacobs have been undertaking for the scheme itself, and thus provides the latest and most accurate assessment of the impacts of the scheme. This is supported by our direct involvement with Highways England TAME in development of the forecasting processes to support delivery of the scheme.

This technical note provides comparisons between the forecasted traffic flows in 2019 and 2034 with the PWD scheme in place, and the traffic flows in 2019 and 2034 without the PWD scheme.

It also provides the result of traffic flow interpolation for 2026 forecast year, which the agreed assessment year for the purposes of this analysis.

This will be used as input to more detailed operational assessment of the junction.

Scenarios

The PWD scheme has been assessed using SATURN highway model which covers the Central Lancashire area (Central Lancashire Transport Model, CLTM) for the 2019 and 2034 version of the model for the AM and PM peaks, and to best represent the forecast impacts of the scheme.

In order to appraise the impacts of the proposed scheme on M55 J1, two scenarios have been produced which provide comparisons between the forecasted traffic flows in 2019 and 2034 forecast years with the scheme in place and without the scheme.

Both forecast year networks incorporate key schemes in the area associated with the forecast years above, and in particular the East West Link Road, and Broughton Bypass; along with widening of the westbound and eastbound slip roads on M55 J1 to three lanes. Signal timings were also optimized as a result of M55 J1 improvements.

These measures have been considered in both Without Scheme and With Scheme scenarios, such that only the impacts of the PWD scheme itself on the junction are detailed in this note.

As agreed with LCC, the Traffic Forecasts that have been used for the forecast years are based on Local Plan Scenario, which includes all development included within the Preston and South Ribble Local Plans.

Of note, this includes the full level of proposed developments within the approved Local Plan for all key sites in North West Preston, at Cottam Hall and associated with the Warton Enterprise zone that are most pertinent to both forecasting of the PWD/ EWL scheme, and operation of M55 junction 1 itself.

In addition, and of note for M55 J1, the traffic demand forecasts also incorporate key developments proposed within Ribble Valley, and that are specifically detailed in Table 1 below.



Description	Number of Dwellings	Employment Site – GFA (m ²)
Spout Farm Road, Preston, Longridge	32	-
Land South of Preston Road, Longridge	350	-
Parsonage Road	60	-
Land north of Ramsgreave Drive	450	-
Land at Chapel Hill, Longridge	53	-
Water Meadows Road, Preston, Longridge	58	-
Dilworth Lane, Longridge	220	-
Chipping Road, Longridge	110	-
Former Whittingham Hospital	-	5,600 (750 jobs)
Total	1,333	5,600

Table 1: Ribble Valley Developments

Traffic Flow Changes with PWD scheme

Figure 1 to Figure 4 show the predicted hourly demand flows differences, in PCU's, between the with and without PWD for the AM and PM peak hours in 2019 and 2034.

The blue bandwidth represents reduction in flow and green represents flow increase.

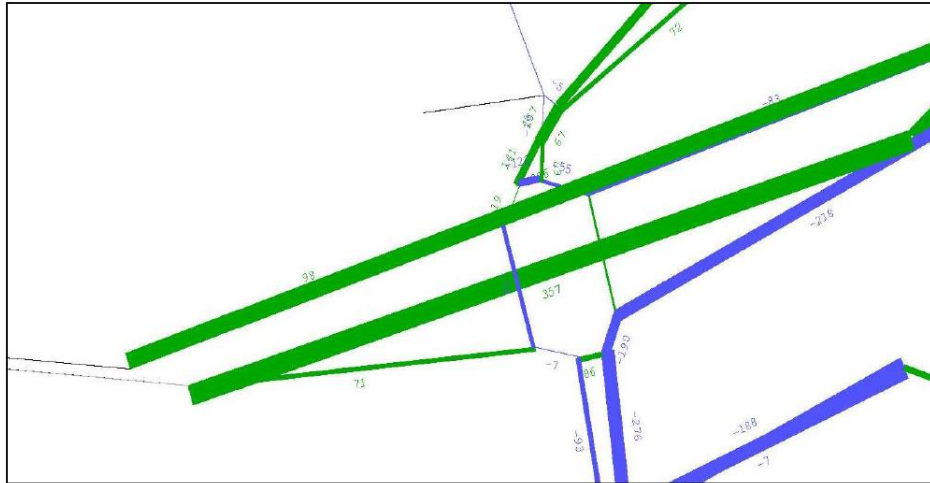


Figure 1: 2019 AM Peak Hour Traffic Flow Difference Plot between With and Without PWD Scenarios

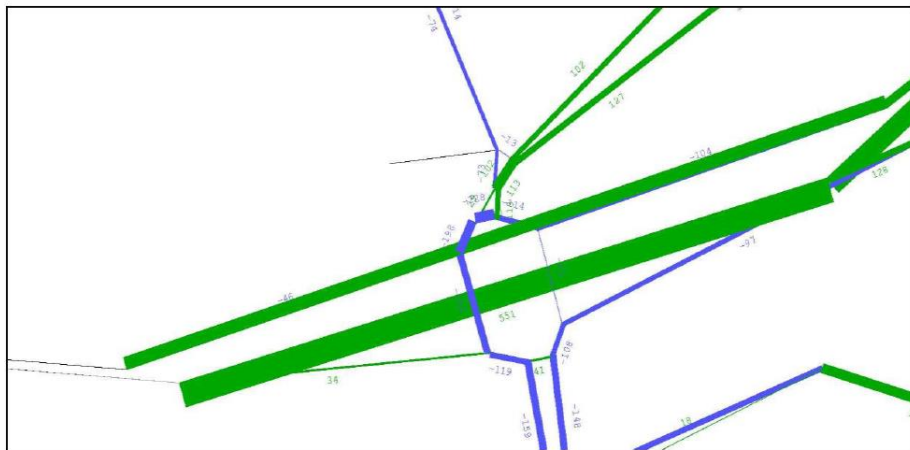


Figure 2: 2019 PM Peak Hour Traffic Flow Difference Plot between With and Without PWD Scenarios

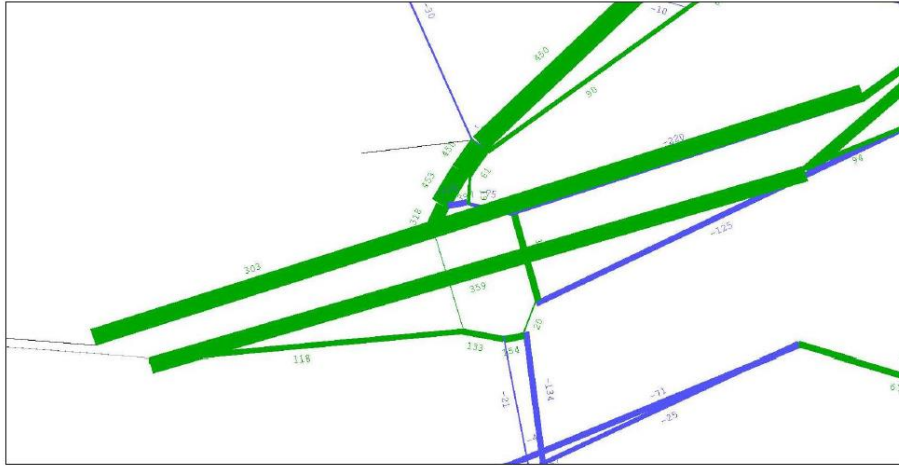


Figure 3: 2034 AM Peak Hour Traffic Flow Difference Plot between With and Without PWD Scenarios

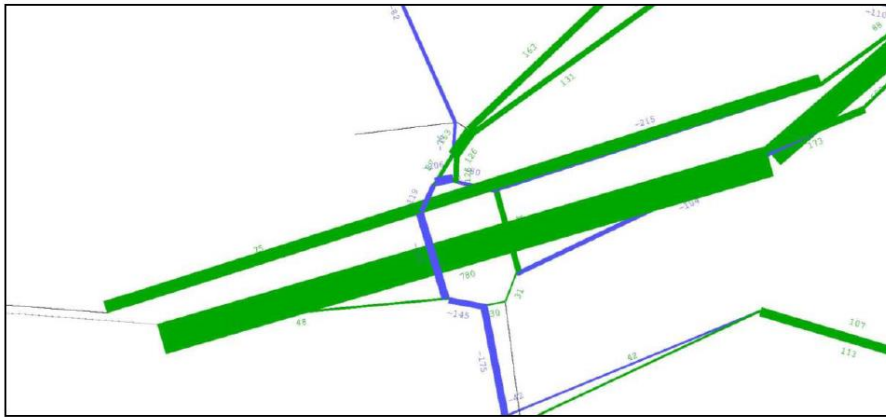


Figure 4: 2034 PM Peak Hour Traffic Flow Difference Plot between With and Without PWD Scenarios

Observations

The following observations between the scenarios of with and without the scheme can be seen:

- In both forecast years, there is an increase in traffic flow travelling east-west along the mainline of the M55 J1. This is to be expected with a new M55 J2 in place associated with the PWD scheme.
- In both forecast years, there significant reductions on the westbound off slip at M55 J1. This is due to the southward facing nature of M55 J2, and reduced demand into Preston on the A6 south of the M55 J1 associated with the PWD scheme.
- In the PM peak there are significant reductions on the southern A6 arm, approaching M55 J1. This is due to the implementation of the PWD and parallel access point to the M55 provided by the scheme at M55 J2. Furthermore, it can be seen that the majority of this traffic is traffic that is turning right at M55 J1; i.e. the same movement now also facilitated by M55 J2 as part of the PWD scheme.
- As the PWD scheme does not extend north of the M55, and increases demand on the M55, there are increases in traffic noted on the A6 north of the M55, and that uses Broughton Bypass. The analysis shows that the traffic which used to rat-run via Thom Benson Way and Woodplumpton Road to travel north will now use the motorway and J1 instead.
- As a result of the above, the M55 J1 roundabout generally experiences flow reduction on most of its sections in 2019 peak hours.
- In 2034, the roundabout will experience combination of flow reductions (mostly on northern and western sections) in both peak times, with spare capacity being used to facilitate additional movements and flow increases from North of the A6, given the dynamic nature of the SATURN reassignment model.

Deriving Updated 2026 Flows

The modelled SATURN future year assignments for PWD are 2019 (scheme opening) and 2034 (scheme design year).

The model output flows for these forecast years have been used to interpolate the corresponding turning movements at M55 J1 for both with and without PWD scenarios in 2026.

Final Results

The predicted turning demand flow differences on M55 J1 between with and without PWD scenarios in 2019 and 2026 are shown in Figure 5 and Figure 6, respectively, for the AM and PM peaks.

These flow differences should be used to support corresponding local junction analyses, and assessment of their operational performance with the PWD scheme in place.

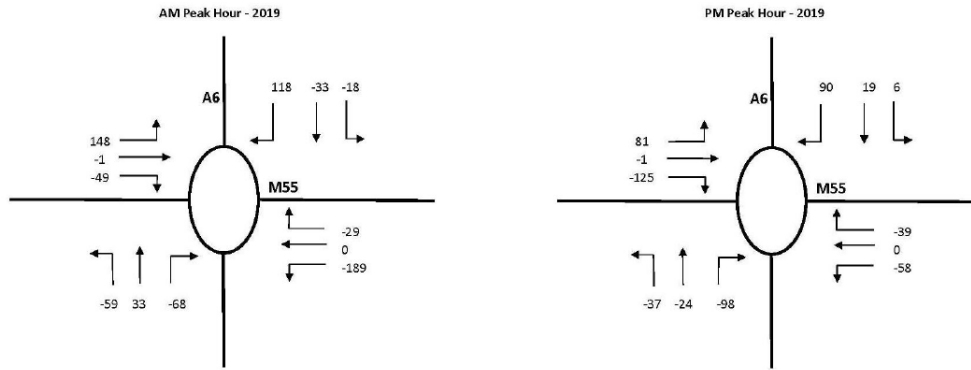


Figure 5: M55 J1 Turning Flow Differences – 2019 Forecast Year

Note: Mainline through traffic on bridges are excluded from the analysis.

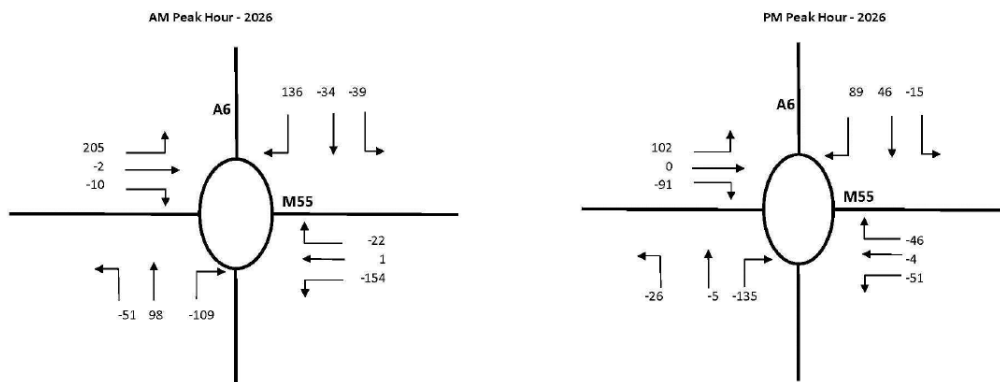


Figure 6: M55 J1 Turning Flow Differences – 2026 Forecast Year

Note: Mainline through traffic on bridges are excluded from the analysis.

APPENDIX D – Jacobs Modelling Note (D'Urton Link)

Date 22 September 2016
From Leighton Cardwell (Jacobs), Sergey Makov (Jacobs), Masoumeh Rajabi (Jacobs)
Subject D'Urton Lane to B6241 Eastway Link Road - SATURN Model Reassignment Assessment
Copies to Lancashire County Council

Introduction

This Technical Note has been produced by Jacobs to summarise the impacts of a new link road to the north of Preston between D'Urton Lane and B6241 Eastway.

The location of the scheme is shown in Figure 1.

The proposed scheme will be a single carriageway, two-lane road with 30mph speed limit and will consist of a new standard roundabout on Eastway and a compact roundabout with cycle by-pass on D'Urton Lane.

A draft drawing of the proposed link road was provided by Lancashire County Council (LCC), presented in Appendix A.

The primary objective of the proposed link road is to allow access to D'Urton Lane and a new residential site to the north of Eastway.

The link road becomes of importance particularly with the opening of Broughton Bypass, which will result in closure of the eastern end of D'Urton Lane.

It also provides the result of M55 J1 traffic flow interpolation for 2026 forecast year, which will be used as input to more detailed operational assessment of this junction.

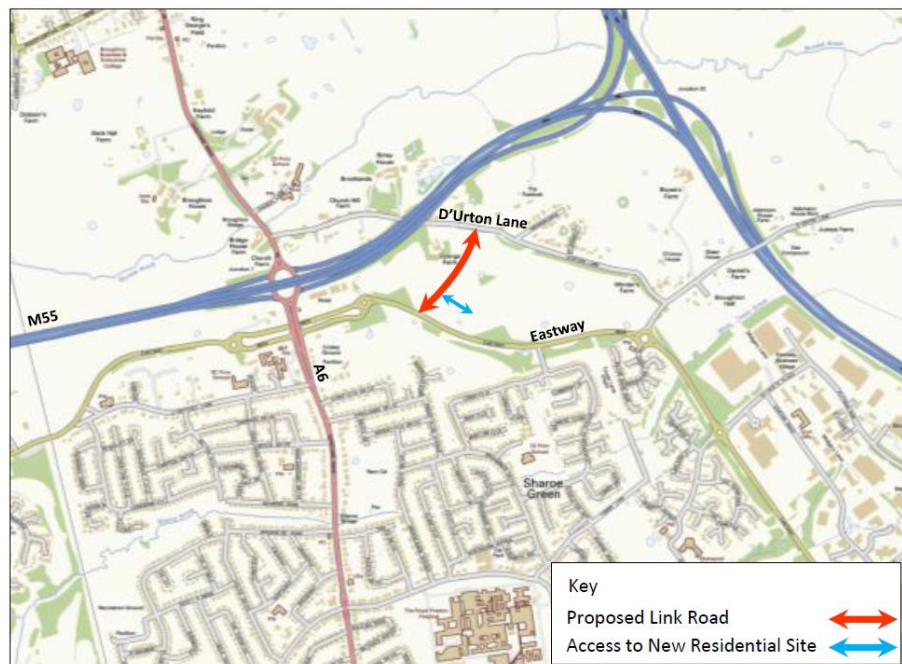


Figure 1: Proposed Link Road Location

Scenarios Considered

The proposed D'Urton Lane to Eastway Link Road has been assessed using SATURN highway model which covers the Central Lancashire area (Central Lancashire Transport Model, CLTM) for the 2019 and 2034 version of the model for the AM and PM peaks, and to best represent the forecast impacts of the scheme.

In order to appraise the impacts of the proposed scheme, two scenarios have been produced which provide comparisons between the forecasted traffic flows in 2019 and 2034 forecast years with the scheme in place and without the scheme on the surrounding road network.

Both forecast year networks incorporate the Preston Western Distributor (PWD), East West Link Road, Broughton Bypass; along with widening of the westbound and eastbound slip roads on M55 J1 to three lanes. These measures have been considered in both Without Scheme and With Scheme scenarios.

Signal timings were also optimized as a result of M55 J1 improvements.

As agreed with LCC, the Traffic Forecasts that have been used for the forecast years are based on Local Plan Scenario, which includes all Preston and South Ribble Local Plan developments as well as the new residential site adjacent to the D'Urton link itself.

Of note, this includes the full level of proposed development within the approved Local Plan sites; for example the full extent of development at North West Preston, Cottam Hall and Warton EZ that are most pertinent to the analysis of PWD and its impact on the M55.

In addition, the traffic demand forecasts also incorporate proposed developments in Ribble Valley, which are presented in Table 1.

Description	Number of Dwellings	Employment Site – GFA (m ²)
Spout Farm Road, Preston, Longridge	32	-
Land South of Preston Road, Longridge	350	-
Parsonage Road	60	-
Land north of Ramsgreave Drive	450	-
Land at Chapel Hill, Longridge	53	-
Water Meadows Road, Preston, Longridge	58	-
Dilworth Lane, Longridge	220	-
Chipping Road, Longridge	110	-
Former Whittingham Hospital	-	5,600 (750 jobs)
Total	1,333	5,600

Table 1: Ribble Valley Developments

Traffic Model Validation

The CLTM forecast year models have been derived from the 2014 base year model, which has been suitably calibrated and validated in accordance with the Department for Transport's modelling guidance (WebTAG) for the Central Lancashire Area.

Table 2 provides count calibration and validation results, undertaken based on guidance from TAG Unit M3.1, for the links in the study area.

As presented, all links meet the GEH and DMRB criteria in both peak times, except Eastway westbound flow in the AM peak. It should however be noted that this link is not far from GEH threshold of 5, and is thus only a marginal fail set against guidance.

Peak Hour	Description	Observed Flow (VEH)	Modelled Flow (VEH)	Actual Difference	GEH Statistic	DMRB Compliant	PASS
AM	M55 Within J1 – Eastbound	1,847	1,770	-77	1.8	Yes	PASS
	M55 Within J1 – Westbound	2,209	2,154	-55	1.2	Yes	PASS
	B6241 Eastway East of A6 – Eastbound	897	907	10	0.3	Yes	PASS
	B6241 Eastway East of A6 – Westbound	523	389	-134	6.3	No	FAIL
PM	M55 Within J1 – Eastbound	2,248	2,246	-2	0	Yes	PASS
	M55 Within J1 – Westbound	2,055	2,055	0	0	Yes	PASS
	B6241 Eastway East of A6 – Eastbound	645	669	24	0.9	Yes	PASS
	B6241 Eastway East of A6 – Westbound	735	835	100	3.6	Yes	PASS

Table 2: Link Flow Calibration and Validation Results

Impacts of D'Urton Lane to Eastway Link Road Scheme on Traffic Flows

This section discusses the impacts of the proposed link road on the surrounding road network.

This is undertaken by comparing traffic flows between the 'With Scheme' and 'Without Scheme' scenarios for the AM and PM peaks.

Figure 2 shows the key plan of the roads referenced in the discussion of results.

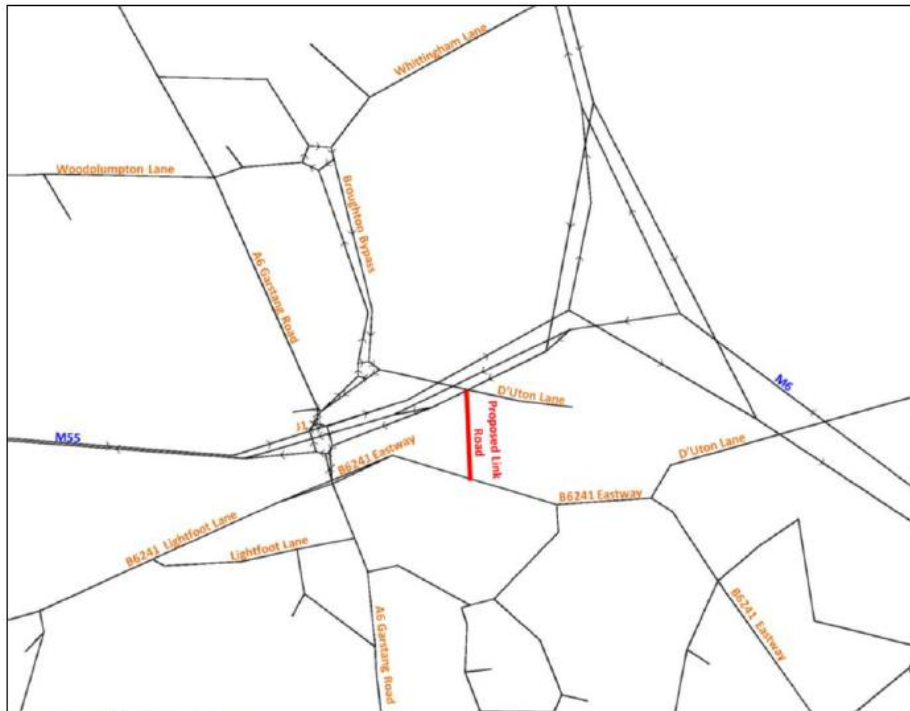


Figure 2: Road Names Key Plan

Figure 3 to Figure 6 show the forecast differences in hourly traffic flows, in Passenger Car Unit (PCU), between the With and Without Link Road scheme for the AM and PM peak hours.

The blue bandwidth represents reduction in flow and green represents flow increase.

The D'urton Lane link itself would also be coloured green, just that the SATURN network difference plots cannot show this, as the link is not in both scenarios.

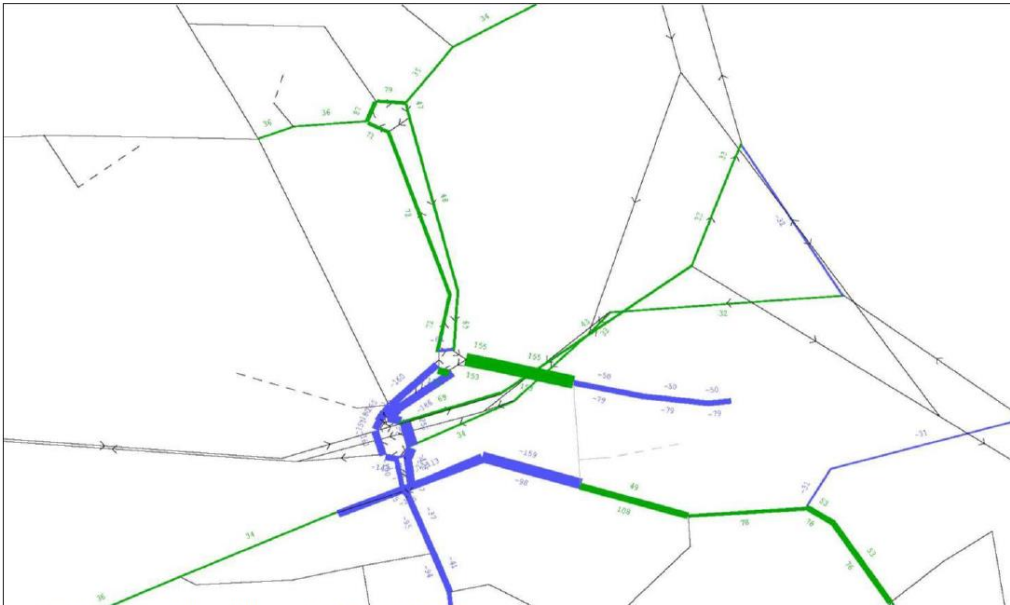


Figure 3: Traffic Flow Difference Plot With and Without Link Road Scheme – 2019 AM Peak Hour

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Figure 4: Traffic Flow Difference Plot With and Without Link Road Scheme – 2019 PM Peak Hour

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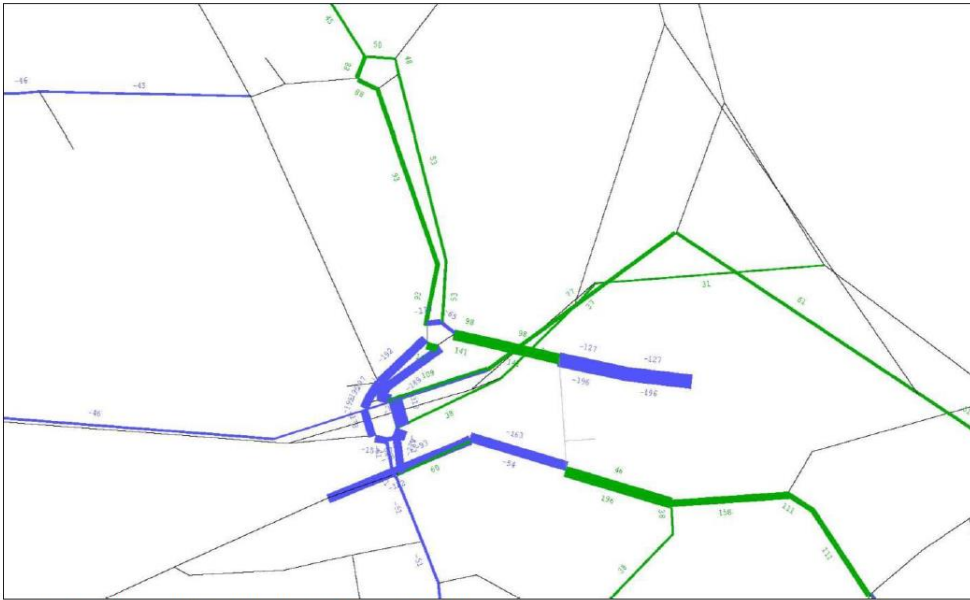


Figure 5: Traffic Flow Difference Plot With and Without Link Road Scheme – 2034 AM Peak Hour

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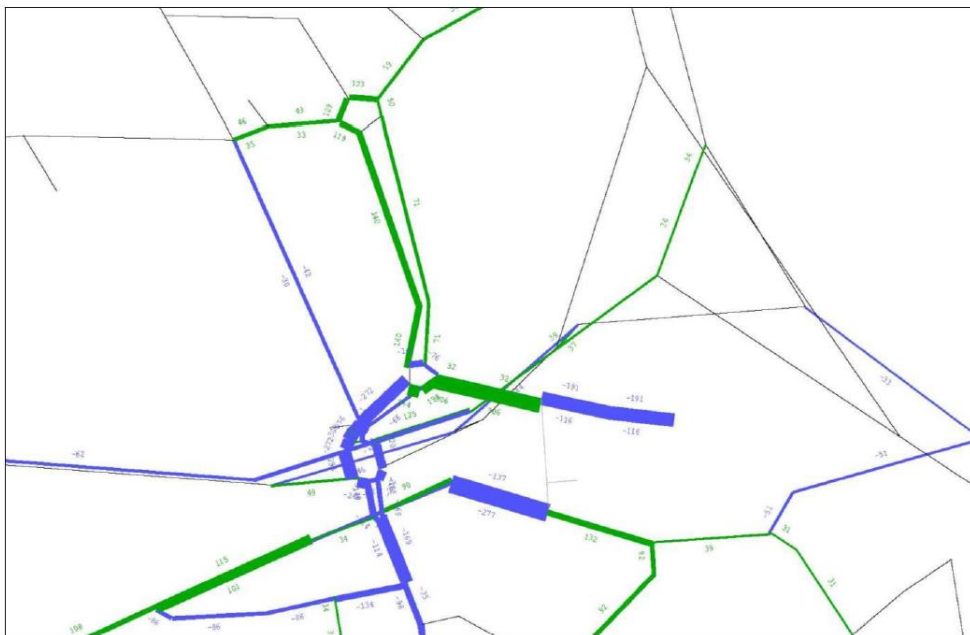


Figure 6: Traffic Flow Difference Plot With and Without Link Road Scheme – 2034 PM Peak Hour

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As shown, the overall patterns of the proposed link road impact on the surrounding road network are similar during AM and PM peak times in both years.

The main result of the proposed link road is a direct reduction of flow on M55 J1 by approximately 200 to 300 PCU's an increase on D'Urton Lane during peak times in both years.

The reduction of traffic flow also therefore frees up some capacity at this junction and therefore there are slight increases noted on the east-west slip road approaches, in particular those exiting the junction.

The provision of the proposed link road is forecast to transfer the north-south traffic from M55 J1 to D'Urton Lane, resulting in flow reduction on the section of Eastway to the west of the link road, A6 Garstang Road to the south of M55 J1 and the connecting road between the M55 J1 and Broughton Bypass roundabout.

The reduction on Eastway is approximately 300 PCU's and 350 PCU's in the AM and PM peaks, respectively, in 2019 and by approximately 200 PCU's and 400 PCU's in the AM and PM peaks, in 2034.

The highest reduction on A6 Garstang Road occurs during PM peak by approximately 200 PCU's in 2019, rising to 300 PCU's in 2034.

Moreover, traffic that previously used the A6 Garstang Road to travel to/from the M55 J1, predominantly reroute to Eastway to use the proposed link. Therefore the flow on the section of Eastway to the east of the proposed scheme has increased by 150 PCU's in 2019 peak times and by 130 PCU's and 250 PCU's in AM and PM peak hours in 2034.

It should be noted that the flow reduction on the southern end of D'Urton Lane is due to provision of new access point for the zone in this area via the proposed link road. This indicates that traffic will use the new access arrangement on the link road to enter/exit the development.

Forecast Traffic Demand on the D'Urton Lane to Eastway Link Road

Table 3 presents the directional forecast flow traveling along the proposed link road.

In 2019 AM peak hour, there will be equal traffic load on each direction and the proposed link road between D'Urton Lane and Eastway is forecast to carry approximate flow hourly flow of approximately 300 (PCU).

In 2034 AM peak hour, northbound traffic is higher than the southbound traffic. The link road is forecast to carry hourly flow of 440 PCU's in northbound direction and 400 PCU's in southbound direction.

In PM peak hour, northbound traffic is higher than the southbound traffic in both 2019 and 2034. The maximum directional flow will be 470 PCU's in 2019 and 550 PCU's in 2034.

Peak Hour	Direction	2019	2034
AM	Northbound	303	440
	Southbound	306	399
	Total (pcu's)	609	839
PM	Northbound	472	555
	Southbound	232	283
	Total (pcu's)	704	838

Table 3: Proposed Link Road Traffic Flow

Figure 7 and Figure 8 show the select link analysis of the proposed scheme for 2019 and 2034 forecast years.

As shown, the majority of traffic forecast to use the link road travel in the north-south direction between Broughton Bypass and B6241 Eastway. A small proportion of northbound traffic, some of which come from the new development, is forecast to use the link road to travel towards M6 via Broughton Bypass roundabout and M55 J1.



Figure 7: 2019 Forecast Year Select Link Analysis



Figure 8: 2034 Forecast Year Select Link Analysis

Overall Conclusions & Observations

The following conclusions can therefore be noted from the SATURN modelling analysis:

- Patterns of the proposed D'Urton Lane to B6241 Eastway Link Road impacts on the surrounding roads are similar during peak times in both forecast years.
- The main result of the proposed link road is a direct reduction of flow on M55 J1 by approximately 200 to 300 PCU's during peak times in both years.
- The traffic flow is expected to increase on D'Urton Lane and Broughton Bypass, as the majority of traffic on the proposed scheme will be north-south traffic traveling to/from Broughton Bypass.
- Other impacts of the proposed link road are generally minor.
- During the AM peak hour in 2019, the proposed D'Urton Lane to B6241 Eastway Link is expected to carry a largely equal amount of traffic flow in each direction;
- Northbound traffic is slightly higher than the southbound traffic by 2034, especially in the AM peak hour.
- The directional traffic is forecast to be 300 Passenger Car Unit (PCU's) in 2019, rising to up to 400-450 PCU's in 2034 in AM peak hour.
- In PM peak hour, northbound traffic is higher than the southbound traffic in both 2019 and 2034. The maximum directional flow will be 470 PCU's in 2019, close to 550 PCU's by 2034.

Overall, the impacts are predominantly on key links in the vicinity of the proposed link road, with only very minor changes on wider network routing beyond this area.

Deriving Updated 2026 Flows

The model output flows for 2019 and 2034 forecast years have been used to interpolate the corresponding turning movements at M55 J1 for both with and without D'Urton Link Road scenarios in 2026.

Figure 9 and Figure 10 show the predicted turning demand flow differences on M55 J1 in 2019 and 2026.

These flow differences should be used to support corresponding local junction analyses, and assessment of their operational performance with the D'Urton Link Road scheme in place.

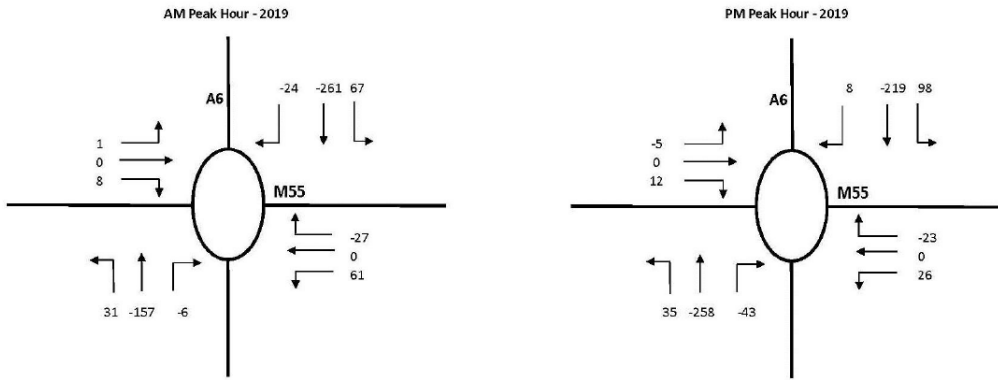


Figure 9: M55 J1 Turning Flow Differences – 2019 Forecast Year

Note: Mainline through traffic on bridges are excluded from the analysis.

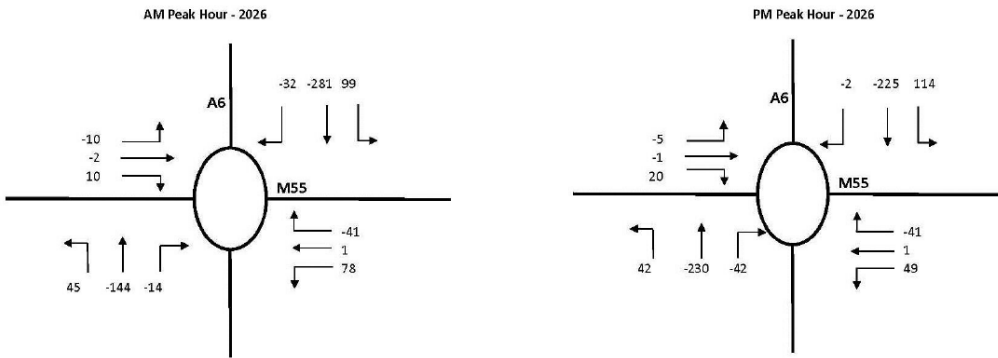
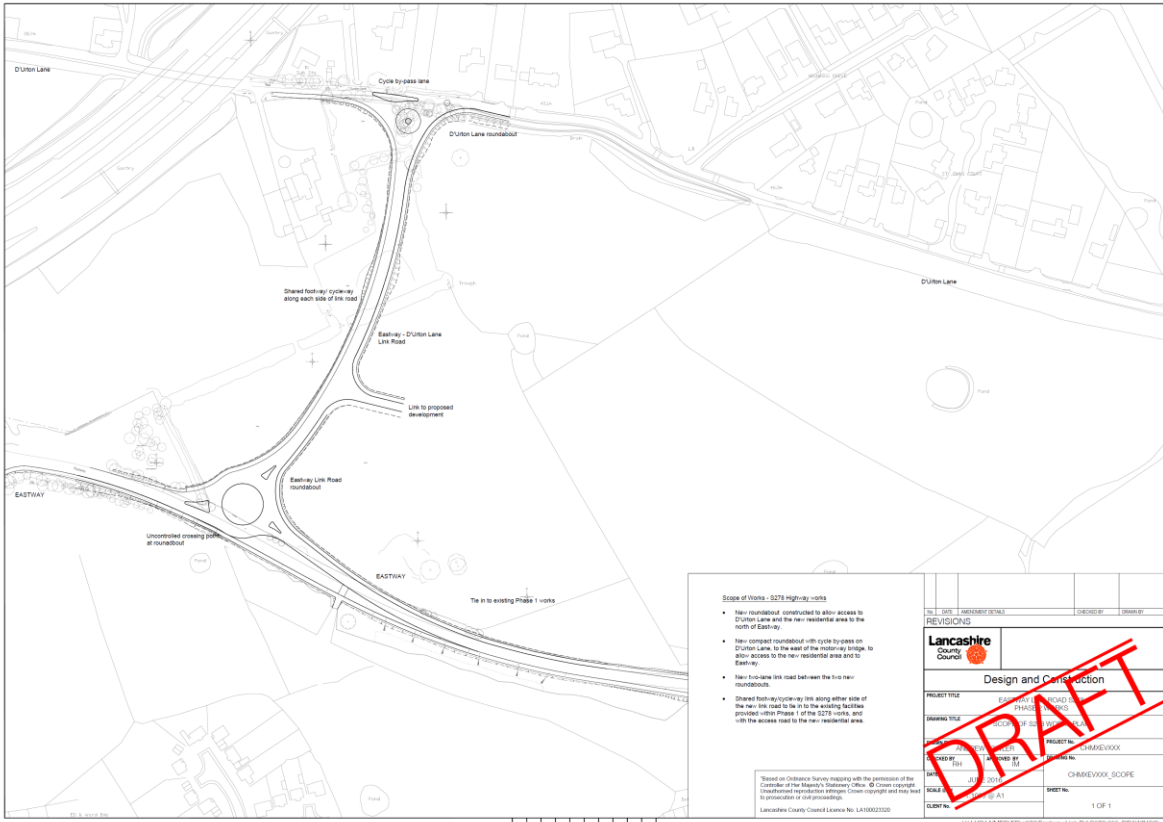


Figure 10: M55 J1 Turning Flow Differences – 2026 Forecast Year

Note: Mainline through traffic on bridges are excluded from the analysis.



Appendix A: D'Urton Lane to B6241 Eastway Link Road Draft Drawing



Scope of Works - S273 Highway works

- New roundabout constructed to allow access to Dutton Lane and the new residential area to the north of Eastway.
- New compact roundabout with cycle bypass on Dutton Lane to the east of the existing bridge, to allow access to the new residential area and to Eastway.
- New two-lane link road between the two new roundabouts.
- Shared footway/cycleway link along either side of the new link road to tie in to the existing facilities provided within Phase 1 of the S273 works, and with the access road to the new residential area.

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NO.	DATE	REVISION/DETAILS	DESIGNED BY	DRAWN BY
REVISIONS				
Lancashire County Council				
Design and Construction				
PROJECT TITLE	S273 HIGHWAY WORKS			
DRAWING TITLE	PHASE 1 - DESIGN OF EASTWAY LINK ROAD			
SCALE	AS SHOWN			
DESIGNED BY	DATE	DRAWN BY	PROJECT NO.	CHM5EYXX1_SCOPE
CHECKED BY	DATE	DATE	PROJECT NO.	CHM5EYXX1_SCOPE
SHEET NO.	1 OF 1			
CLIENT NO.	10/10/10			



APPENDIX E – List of Large Development Sites Used in the Analysis

Model 4

Used in Earliest Model No.	Application Number	Site	status	Residential size	Commercial size
				(dwellings)	(m ²)
	PRESTON DISTRICT			5851	
1	06/2011/0630 & 06/2013/0535	Lime Chase	Committed	70	
1	06/2012/0094	Lightfoot Green Lane	Committed	125	
1	06/2012/0822	Lightfoot Lane	Committed	330	
1	06/2015/0530	CEG	Committed	350	
1	06/2013/0140	Maxy House farm Wainhomes	Committed	350	
1	06/2016/0391	45 Dwellings at Barton	refused	45	
1	06/2012/0145	Cottam Hall	Committed	1100	
1	06/2011/0473 & 06/2012/0856	Haydock Grange	Committed	450	
1	06/2015/0173	Durton Lane - Beck Developments	Committed	7	
1	06/2013/0019 & 06/2014/0856	Rear of Our Lady School	Committed	22	
1	06/2015/0282 & 06/2014/0352 & 06/2012/0822	Redrow	Committed	330	
1	06/2013/0349	N of Eastway	Committed	300	
1	06/2016/0291	Maxy House Farm	Committed	230	
1	06/2009/0499	Cottam Brickworks	Committed	206	
1	06/2012/0101	Riddings Depot	Committed	200	
1	06/2014/0248	Ridding Phase 2	Committed	190	
1	06/2014/0442 & 06/2012/0422	Sandyforth Lane	Committed	189	
1	06/2016/0504	140 Dwellings at Eastway - Barratts	Committed	140	
1	06/2015/0769	112 Dwellings Durton La (Persimmon)	Committed	112	
1	06/2016/1039	Goosnargh Lane, Goosnargh	Committed	98	
1	06/2012/0544	Moses Farm	Committed	81	
1	06/2015/0306	Wainhomes, Barton (Preston)	Committed	72	
2	06/2016/0736	Bank Hall Farm, Broughton	refused	97	
1	06/2015/0816	61 dwelling Whittingham Lane	Committed	61	
2	06/2016/1207	Cardwell Farm Barton	refused	55	
1	06/2014/0987 & 06/2015/389	122 Hoyles Lane	Committed	48	
1	06/2016/367	Sandy Lane	Committed	30	
1	06/2016/0124	Pudding Pie Nook Lane	refused	24	
1	06/2014/786	242 Lightfoot Lane	Committed	12	
1	06/2015/739	3 Nog Tow Bank	Committed	8	
1	06/2014/685	154 Hoyles Lane	Committed	6	
2	06/2017/0181	Ingol Golf Club Mixed Use PNE phase 1	Committed	250	
2	06/2017/0097	Key Fold farm	refused	130	

3	06/2017/0831	Land N of D'Urton Lane HCA	Committed	250	
3	06/2017/0941	126A Whittingham Lane	Pending	101	
1	06/2014/0588	Eastway Nurseries	Committed	24	
WYRE DISTRICT				1566	
1	15/00248	Joe Lane	Committed	200	10000
1	16/00090/FULMAJ	Garstang Rd, Myerscough	Committed	26	
1	15/00420/OUTMAJ	Garstang Rd, Bowgreave	Committed	46	
1	15/00891/OUTMAJ	Garstang Country Hotel	Committed	95	
1	15/00928/OUTMAJ	Calder House Lane	Committed	49	
1	16/00144/OUTMAJ	Daniel Fold Farm 2	Committed	66	
1	16/00230/OUTMAJ	Lancaster New Rd, Cabus	refused	183	
1	14/00458/OULMAJ 16/00241/OUTMAJ	Nateby Crossing Lane	Committed	269	46800
1	16/00481/OUTMAJ	Inskip	Committed	55	
1	14/00266	Kepple Lane	Committed	130	
1	14/00681	Daniel Fold Farm	Committed	122	
1	16/625	Barton Wainhomes (Wyre)	Committed	72	
1	14/00053	Utopia	Committed	75	
1	13/00376	The Toppings, Barnacre	Committed	64	
2	16/955	Tan Yard Road (6000sqm industrial)	Committed		6000
2	16/01058/OUTMAJ	Billsborrow Lane	Pending	50	
2	16/00513/OUTMAJ	Goose Lane, Garstang	Pending		6872
2	16/01031/OUTMAS	The Willows, Billsborough	Pending	19	
1	14/00353	Stubbins Lane	Committed	45	
1	16/807	Shepherds Farm, Barton	Committed	34	
1	15/00040	Bowgreave House farm	Committed	30	
1	15/00072	Avonhurst, Barton	Committed	29	
1	14/00518	Ribblesdale Drive, Forton	Committed	27	
1	14/00595	Preston Rd, Inskip	Committed	27	
1	14/00450	Hollins Lane, Forton	Committed	19	
1	16/00550	Garstang Business Park	Committed	16	
1	14/00821	Hollins Lane, Forton	Committed	14	
1	13/00864	School Lane, Forton	Committed	12	
1	13/00882	Pickerings Hotel	Committed	10	
1	15/00910/FULMAJ	The Thatch, Cabus	Committed	10	
1	16/00055/FULMAJ	Catterall Lodge Farm	Committed	10	
1	13/00607	Catterall Gates Lane	Committed	9	
1	14/00321	Garstang Road, Bowgreave	Committed	7	
RIBBLE VALLEY DISTRICT				1593	
1	03/2014/0764	Chipping Lane, Longridge	Committed	363	
1	3/2015/0099	Land S of Preston Rd (Grimblesdon Fm)	Committed	350	
1	3/2014/0517	Land to the north of Dilworth Lane	Committed	220	
1	06/2007/0946 & 06/2011/416 & 06/2014/0353	Whittingham Hospital	Committed	660	5600
1	11/1071	Chapel Hill	Committed	53	

1	13/0307	Water meadows Road	Committed	58
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Information deemed to be correct at time of compiling.

Sites in grey are either below the threshold for a TA/TS or no distributions were supplied and so these were not individually added to the final figures but instead would be included within the background growth.

Sites in red have been refused planning permission and have been removed from the calculations.

Some are subject to appeal and may return. (the links to the sites have been removed from the cumulative sheet calculations and the individual tabs have been hidden)

Sites highlighted in yellow are nes sites added after the initial report was done in Dec 2016.

Used in model number indicates the number of the model that the developments were included in (all earlier numbered development are included in later numbered models unless noted)

Model 4a

Used in Earliest Model No.	Application Number	Site	status	Residential size	Commercial size
				(dwellings)	(m ²)
	PRESTON DISTRICT			5851	
1	06/2011/0630 & 06/2013/0535	Lime Chase	Committed	70	
1	06/2012/0094	Lightfoot Green Lane	Committed	125	
1	06/2012/0822	Lightfoot Lane	Committed	330	
1	06/2015/0530	CEG	Committed	350	
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1	06/2014/0588	Eastway Nurseries	Committed	24	
	WYRE DISTRICT			1566	
4a		Cockerham Road	pre-app	250	
1	15/00248	Joe Lane	Committed	200	10000
1	16/00090/FULMAJ	Garstang Rd, Myerscough	Committed	26	
1	15/00420/OUTMAJ	Garstang Rd, Bowgreave	Committed	46	
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1	13/0307	Water meadows Road	Committed	58	

Date of last update: 20th Dec 2017

Notes

Information deemed to be correct at time of compiling.

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Used in model number indicates the number of the model that the developments were included in (all earlier numbered development are included in later numbered models unless noted)

APPENDIX F – Linsig Modelling Output

APPENDIX G – Proportionate Benefits from Highway Infrastructure Improvements for Emerging Developments

Proportionate Benefits from Highway Infrastructure Improvements for Emerging Developments

Emerging developments have been separated by district (Preston, Wyre, Ribble Valley) and are shown in appendix E. The analysis in the main document results in approximately 500 two way trips (average of AM & PM) on the A6 north of D'Urton Lane from these Wyre developments individually identified in appendix E. These trips exclude background growth and smaller development sites as explained previously.

This note estimates the proportionate highway benefits for these Wyre developments 1 provided by the 4 elements of new infrastructure as described below;

- Broughton by-pass with capacity improvement at M55 junction1. The by-pass itself would result in rerouting effects, but the scheme also provides an extra circulatory lanes to improve the junction capacity.
 - The scheme is in construction and will be completed by spring 2017.
- Slip Road widening for both westbound and eastbound exit slips from 2 to 3 lanes. To improve the junction capacity but also with safety benefits by reducing the impact on queuing onto the motorway mainline. Fundamentally this builds upon the benefits resulting from the Broughton by pass scheme.
 - Funded through planning obligations (s106) from development.
- The Preston Western Distributer with associated East West Link Road and new M55 junction 2 is also predicted to provide capacity benefits at M55 junction 1. There will be a reduction in traffic flows through the junction but, significantly, there will be a redistribution of traffic patterns that transfers movements from critical, capacity limiting, nodes to less critical nodes resulting in good capacity improvements. The planning application submitted is to be determined by LCC planning committee early in 2017.
 - Its approval would provide planning certainty on it being delivered.
- The provision of a new link road from Eastway to D'Urton Lane that provide routing options away from M55 junction1.
 - To be delivered through a S278 with Story Homes.

The traffic figures in the main document show that for an average AM/PM peak hour in 2026 with all development and changes as highlighted above including those which reroute traffic approximately 6,000 vehicles are predicted to travel through the junction (as a whole). In comparison in 2016 in an average peak hour a total of 5,400 vehicles are observed to pass through the junction. This signifies that the junction with its proposed slip road widening and other changes as part of Broughton Bypass will cater for an additional 600 vehicles.

In addition other trips comprising development and background growth that would use the M55 mainline and not need to use the M55 junction 1 roundabout as a result of the PWD and related highway infrastructure.

It is important to note that all four changes give individual but also intertwined complementary benefits to junction and network capacities. Some changes directly affect junction capacity because of an increase in lanes, others change the pattern of movement and or effect traffic numbers. It is not possible without a very complex, time consuming, costly and ultimately with much uncertainty to calculate the benefit in vehicle numbers of each change in isolation without a significant number of scenario tests. This is also the same for a calculation to determine the influence on each districts' traffic in isolation.

Notwithstanding this, it is reasonable with the modelling results and engineering judgement to gauge the proportionate benefits. LCC's professional traffic signal engineer estimates that the benefits resulting from the:

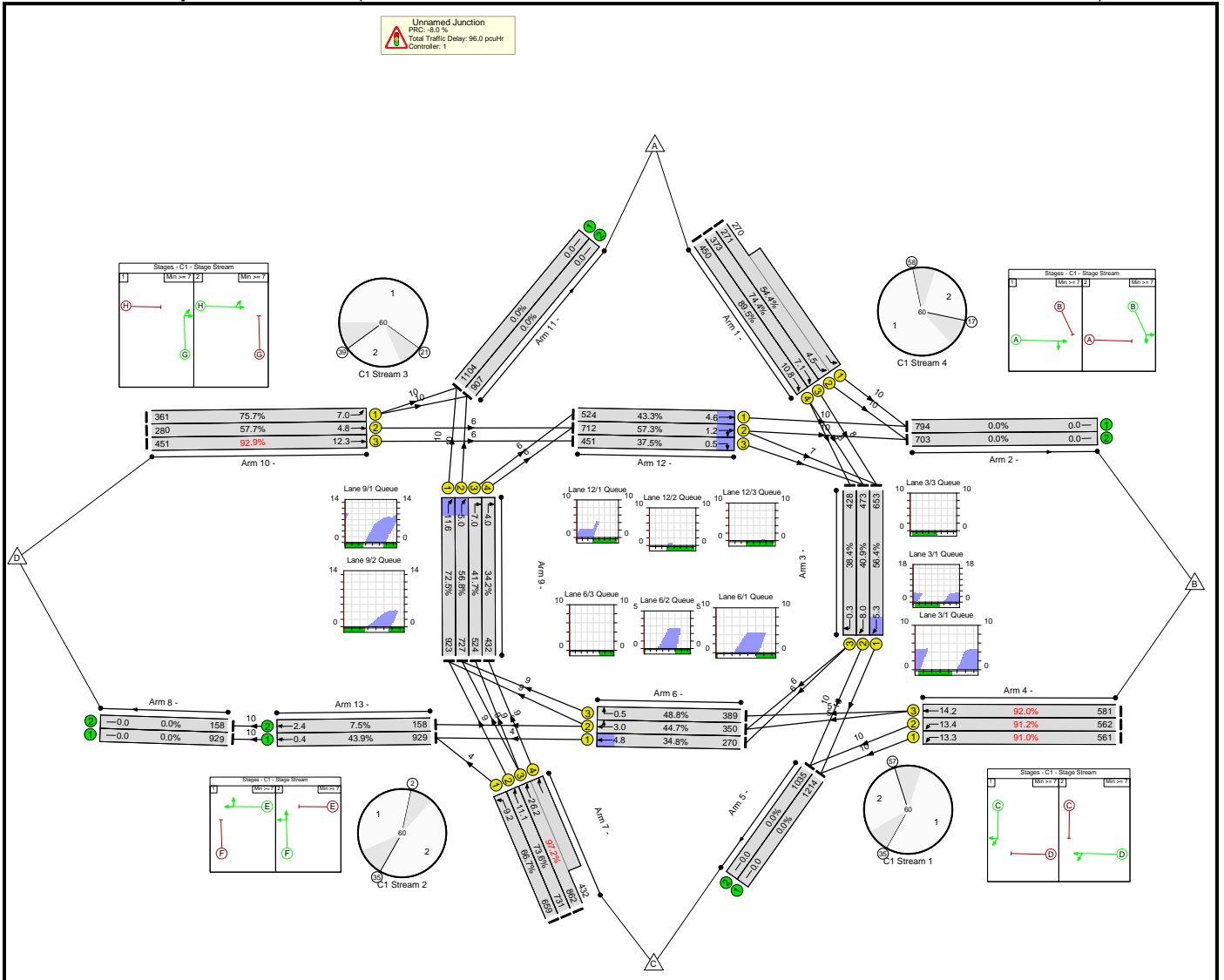
- M55 J1 changes would be approximately 35%
 - Broughton by-pass scheme with the changes at M55 J1
 - the slip road widening (developer funded)
- D'Urton Lane link road would be approximately 15%
- The remaining capacity benefits is therefore attributed to the PWD infrastructure at 50%.

To clarify this percentage is not a percentage increase in junction capacity, it is the proportionate benefit to the overall highway network capacity in the vicinity of M55 junction 1 provided by a combination of all 4 scheme when in place in 2026 with the traffic increases as explained in the main document. It must be noted the PWD infrastructure including a new motorway junction would satisfy the need of much of NW Preston as well as some redistribution of trips from the A6 corridor. Some of the changes considered in isolation do influence the location of the critical node at M55 J1 i.e. which approach to the signalised roundabout and the internal link within.

Whilst the above relates to all development in simple terms using these proportions without the benefit of PWD, supporting infrastructure and the D'urton Lane link could support approximately 175 two way trips from Wyre development. The average AM/PM impacts of Joe lane, Daniel Fold and Nateby together equate to 170 two way trips, in addition the D'Urton Lane link would release approximately a further 75 two way trips assuming that the M55 J1 elements are funded and delivered. As previously highlighted the PWD and D'Urton Lane link do change the dynamics of the network and the critical junctions.

Broughton Roundabout scheme

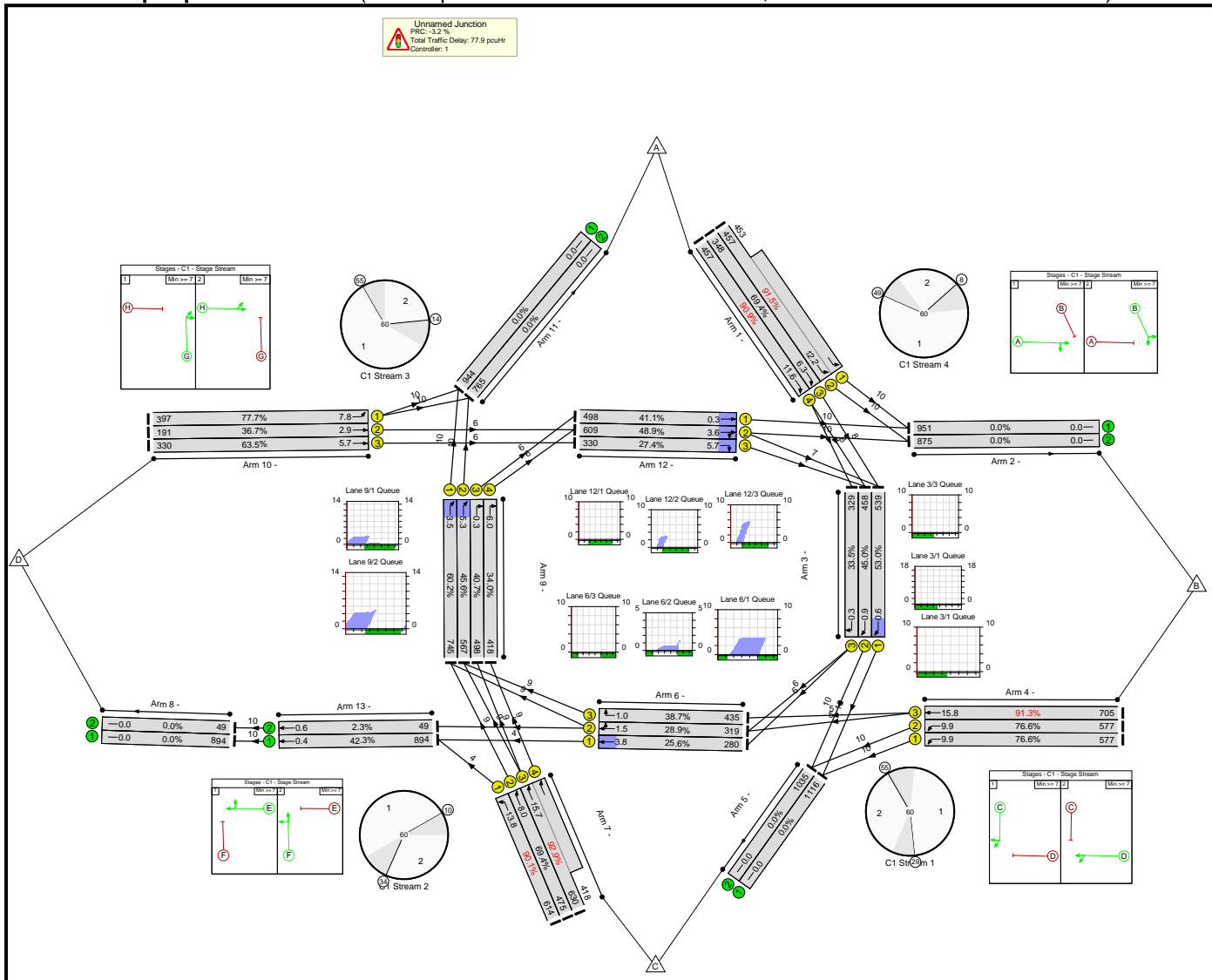
Scenario 1: 'am peak MODEL 4' (FG9: 'am MODEL 4 cumulative 2026', Plan 1: 'Network Control Plan 1')



Network Summary

Controller	Stream	PRC (%)	Total Delay for stream (pcuHr)
C1	1	-2.23	29.36
C1	2	-7.99	26.19
C1	3	-3.25	24.06
C1	4	0.60	15.99
C2	1	0.00	0.00
Total Network Delay: 96.03 pcuHr			
Worst PRC: -7.99 % (On Lane 7/3 in Stream 2)			

Scenario 2: 'pm peak MODEL 4' (FG10: 'pm MODEL 4 Cumulative 2026', Plan 1: 'Network Control Plan 1')

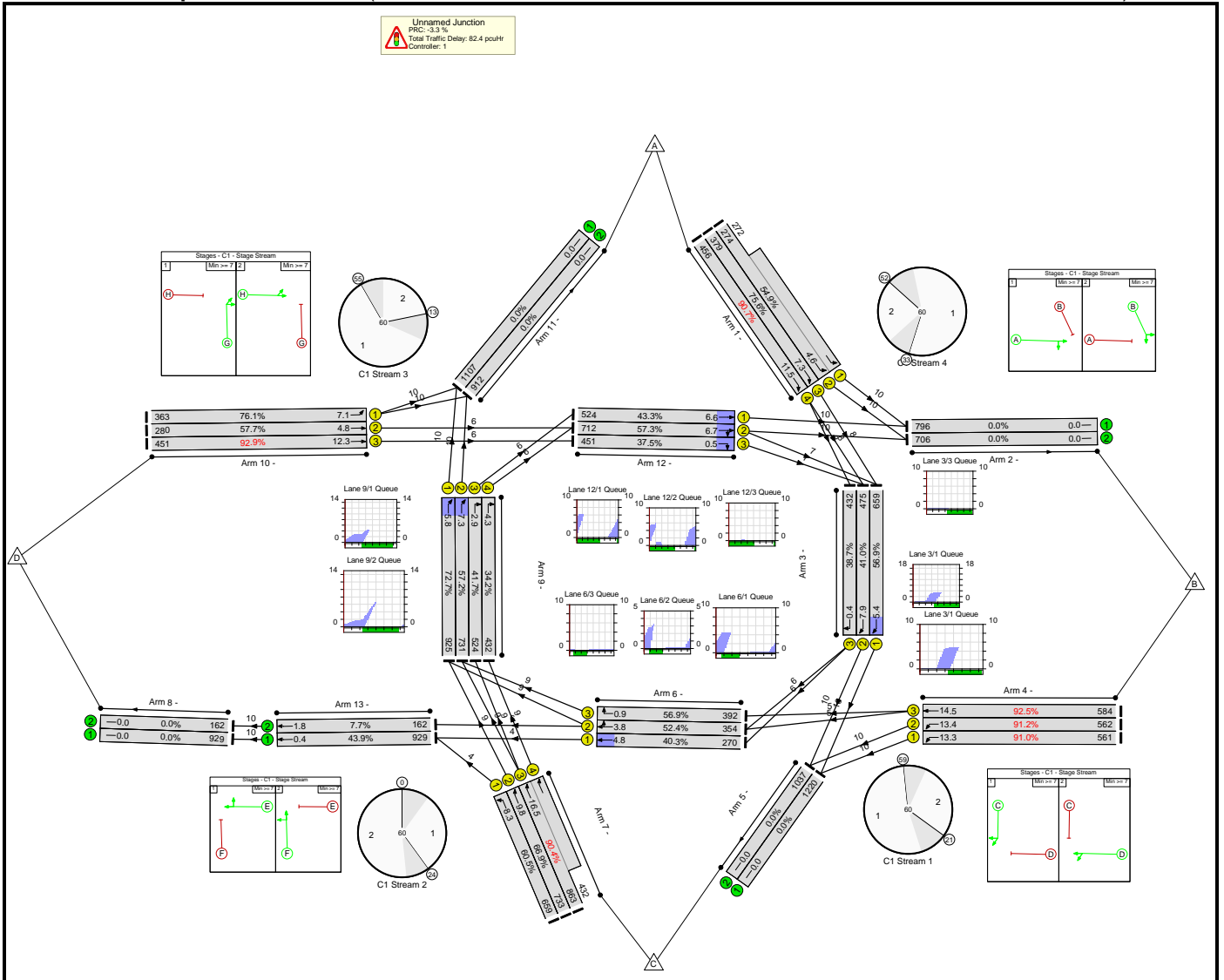


Network Summary

Controller	Stream	PRC (%)	Total Delay for stream (pcuHr)
C1	1	-1.49	18.23
C1	2	-3.24	24.38
C1	3	15.84	12.34
C1	4	-1.72	22.57
C2	1	0.00	0.00
Total Network Delay: 77.91 pcuHr			
Worst PRC: -3.24 % (On Lane 7/3 in Stream 2)			

Broughton Roundabout scheme

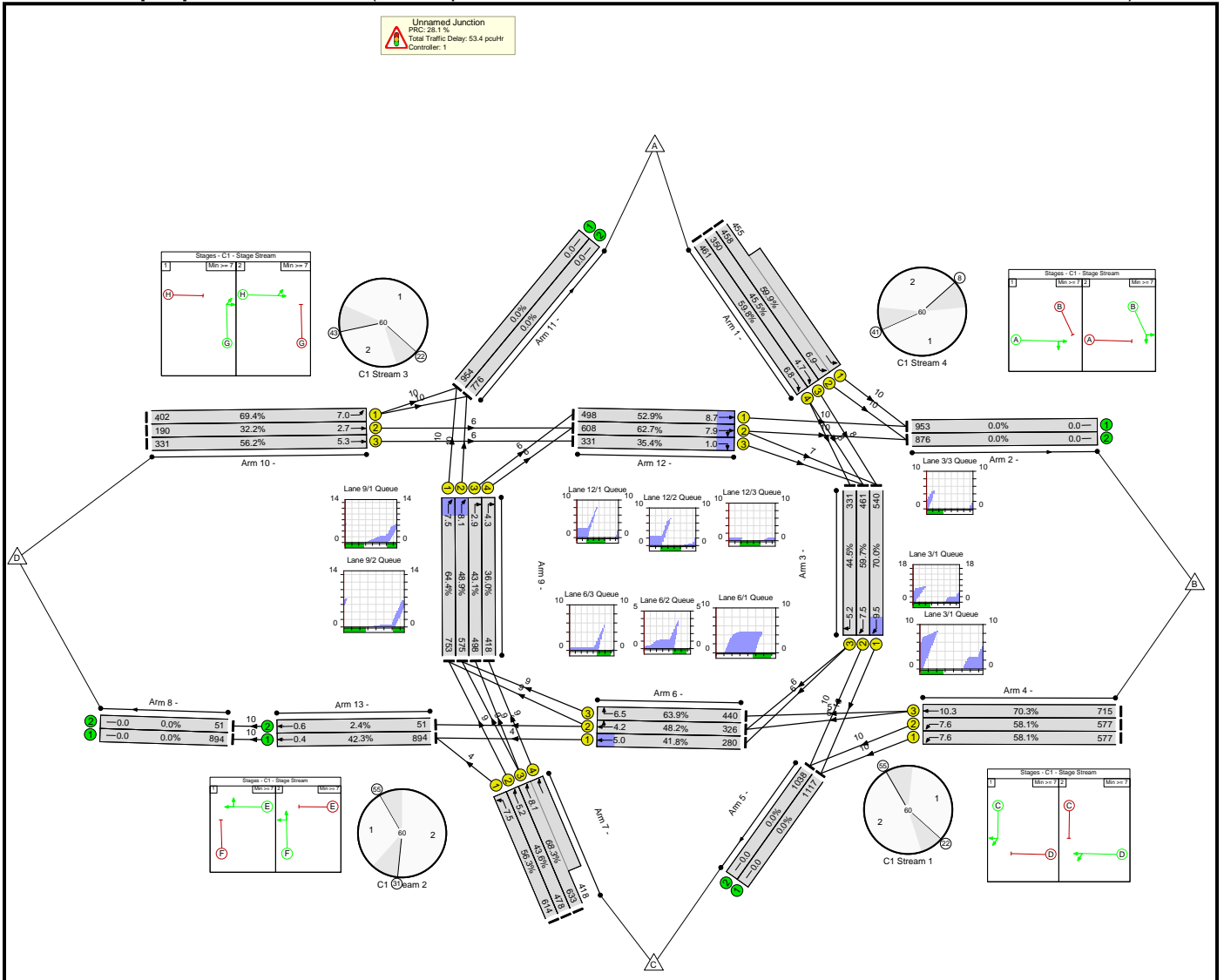
Scenario 1: 'am peak MODEL 4a' (FG9: 'am MODEL 4a cumulative 2026', Plan 1: 'Network Control Plan 1')



Network Summary

Controller	Stream	PRC (%)	Total Delay for stream (pcuHr)
C1	1	-2.75	27.62
C1	2	-0.40	16.86
C1	3	-3.25	19.51
C1	4	-0.73	17.93
C2	1	0.00	0.00
Total Network Delay: 82.36 pcuHr			
Worst PRC: -3.25 % (On Lane 10/3 in Stream 3)			

Scenario 2: 'pm peak MODEL 4a' (FG10: 'pm MODEL 4a Cumulative 2026', Plan 1: 'Network Control Plan 1')



Network Summary

Controller	Stream	PRC (%)	Total Delay for stream (pcuHr)
C1	1	28.07	15.15
C1	2	31.79	12.81
C1	3	29.66	12.04
C1	4	43.48	13.05
C2	1	0.00	0.00
Total Network Delay: 53.42 pcuHr			
Worst PRC: 28.07 % (On Lane 4/3 in Stream 1)			