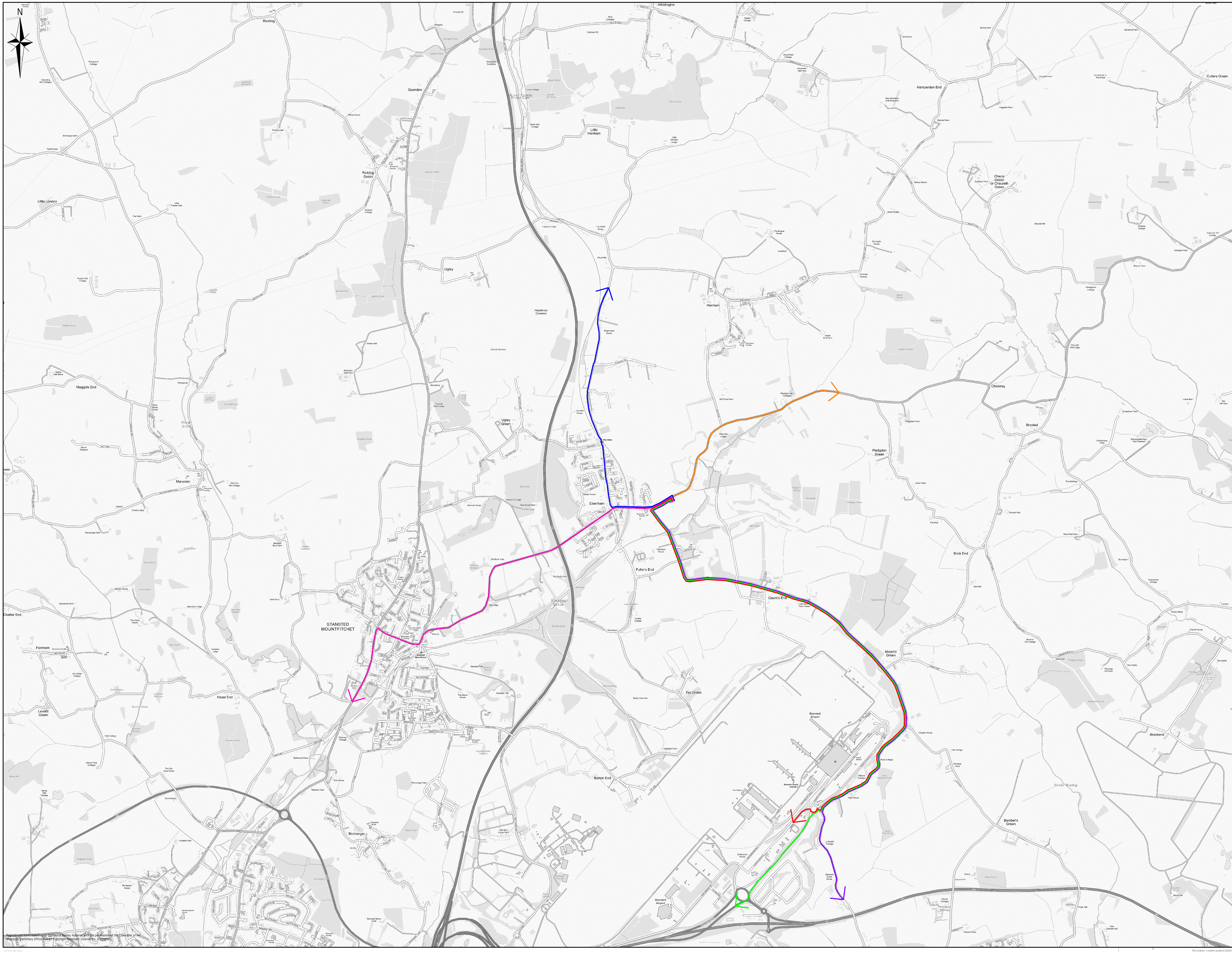

- ROUTE 1: WEST VIA STANSTED MOUNTFITCHET
- ROUTE 2: SOUTH VIA HALL ROAD/THREMHALL AVE
- ROUTE 3: NORTH VIA STATION ROAD
- ROUTE 4: EAST VIA HENHAM ROAD
- ROUTE 5: SOUTH VIA HALL ROAD/PARSONAGE ROAD
- ROUTE 6: SOUTH VIA HALL ROAD/COOPERS END ROAD

DRAFT

Rev	Description	Drn	Chk	App	Date

ARDENT | CONSULTING ENGINEERS

Third Floor
The Hallmark Building
52-56 Leadenhall Street
London
EC3M 5JE

Tel: 020 7680 4088
[redacted]
E-mail: enquiries@ardent-ce.co.uk

worksafe [redacted] SSIP SAFETY SCHEMES IN PROCUREMENT

Client: COUNTRYSIDE PROPERTIES (UK) LIMITED

Project Title: LAND SOUTH OF HENHAM ROAD, ELSENHAM

Drawing Title: PROPOSED DEVELOPMENT ROUTES

A0 Scale	Date	Designed by
1:12000	14.03.22	BT
Drawn by	Checked by	Approved by
BT	FM	IW

Drawing Number	Rev
2008170-014	-

WU03EW - Location of usual residence and place of work by method of travel to work (MSOA level)

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			%
1	West	B1051 via Stansted M	**47%**
2	South	Hall Road/Thremhall Avenue	**28%**
3	North	B1051/Station Road	**5%**
4	East	B1051 Henham Road	**6%**
5	South	Hall Road/Coopers End Road	12%
6	South	Hall Road/Parsonage Road	1%
			100%

population	All usual residents aged 16 and over in employment the week before the census
units	Persons
date	2011
method of travel to work	Driving a car or van

		Route assignment						Percentage applied to routes						Vehicles applied to routes					
place of work : 2011 super output area - middle layer	**E02004595 : Uttlesford 005**	Route 1	Route 2	Route 3	Route 4	Route 5	Route 6	Route 1	Route 2	Route 3	Route 4	Route 5	Route 6	Route 1	Route 2	Route 3	Route 4	Route 5	Route 6
E02000001 : City of London 001	13		1					0	1	0	0	0	0	0	13	0	0	0	0
E02000003 : Barking and Dagenham 002	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02000008 : Barking and Dagenham 007	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02000012 : Barking and Dagenham 011	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02000014 : Barking and Dagenham 013	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02000015 : Barking and Dagenham 014	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02000016 : Barking and Dagenham 015	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02000019 : Barking and Dagenham 018	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02000020 : Barking and Dagenham 019	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02000021 : Barking and Dagenham 020	2		1					0	1	0	0	0	0	0	2	0	0	0	0
E02000024 : Barnet 001	1	1	1					0.5	0.5	0	0	0	0	0.5	0.5	0	0	0	0
E02000028 : Barnet 005	1	1	1					0.5	0.5	0	0	0	0	0.5	0.5	0	0	0	0
E02000031 : Barnet 008	1	1	1					0.5	0.5	0	0	0	0	0.5	0.5	0	0	0	0
E02000033 : Barnet 010	2	1	1					0.5	0.5	0	0	0	0	1	1	0	0	0	0
E02000038 : Barnet 015	1	1	1					0.5	0.5	0	0	0	0	0.5	0.5	0	0	0	0
E02000045 : Barnet 022	1	1	1					0.5	0.5	0	0	0	0	0.5	0.5	0	0	0	0
E02000046 : Barnet 023	1	1	1					0.5	0.5	0	0	0	0	0.5	0.5	0	0	0	0
E02000055 : Barnet 032	1	1	1					0.5	0.5	0	0	0	0	0.5	0.5	0	0	0	0
E02000083 : Bexley 019	3		1					0	1	0	0	0	0	0	3	0	0	0	0
E02000090 : Bexley 026	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02000100 : Brent 008	1	1	1					0.5	0.5	0	0	0	0	0.5	0.5	0	0	0	0
E02000119 : Brent 027	1	1	1					0.5	0.5	0	0	0	0	0.5	0.5	0	0	0	0
E02000134 : Bromley 008	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02000172 : Camden 007	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02000184 : Camden 019	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02000191 : Camden 026	3		1					0	1	0	0	0	0	0	3	0	0	0	0
E02000192 : Camden 027	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02000193 : Camden 028	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02000242 : Ealing 005	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02000243 : Ealing 006	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02000256 : Ealing 019	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02000279 : Enfield 003	5	1	1					0.5	0.5	0	0	0	0	2.5	2.5	0	0	0	0
E02000280 : Enfield 004	4	1	1					0.5	0.5	0	0	0	0	2	2	0	0	0	0
E02000283 : Enfield 007	1	1	1					0.5	0.5	0	0	0	0	0.5	0.5	0	0	0	0
E02000284 : Enfield 008	1	1	1					0.5	0.5	0	0	0	0	0.5	0.5	0	0	0	0
E02000285 : Enfield 009	2	1	1					0.5	0.5	0	0	0	0	1	1	0	0	0	0
E02000286 : Enfield 010	1	1	1					0.5	0.5	0	0	0	0	0.5	0.5	0	0	0	0
E02000288 : Enfield 012	2	1	1					0.5	0.5	0	0	0	0	1	1	0	0	0	0
E02000290 : Enfield 014	10	1	1					0.5	0.5	0	0	0	0	5	5	0	0	0	0
E02000292 : Enfield 016	2	1	1					0.5	0.5	0	0	0	0	1	1	0	0	0	0
E02000294 : Enfield 018	1	1	1					0.5	0.5	0	0	0	0	0.5	0.5	0	0	0	0
E02000296 : Enfield 020	1	1	1					0.5	0.5	0	0	0	0	0.5	0.5	0	0	0	0
E02000298 : Enfield 022	1	1	1					0.5	0.5	0	0	0	0	0.5	0.5	0	0	0	0
E02000300 : Enfield 024	1	1	1					0.5	0.5	0	0	0	0	0.5	0.5	0	0	0	0
E02000301 : Enfield 025	1	1	1					0.5	0.5	0	0	0	0	0.5	0.5	0	0	0	0
E02000305 : Enfield 029	1	1	1					0.5	0.5	0	0	0	0	0.5	0.5	0	0	0	0
E02000306 : Enfield 030	4	1	1					0.5	0.5	0	0	0	0	2	2	0	0	0	0
E02000308 : Enfield 032	2	1	1					0.5	0.5	0	0	0	0	1	1	0	0	0	0
E02000309 : Enfield 033	2	1	1					0.5	0.5	0	0	0	0	1	1	0	0	0	0
E02000316 : Greenwich 004	1		1					0	1	0	0	0	0	0	1	0	0	0	0

E02000340 : Greenwich 028	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02000355 : Hackney 011	2		1					0	1	0	0	0	0	0	2	0	0	0	0
E02000358 : Hackney 014	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02000362 : Hackney 018	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02000363 : Hackney 019	2		1					0	1	0	0	0	0	0	2	0	0	0	0
E02000365 : Hackney 021	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02000368 : Hackney 024	2		1					0	1	0	0	0	0	0	2	0	0	0	0
E02000369 : Hackney 025	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02000370 : Hackney 026	2		1					0	1	0	0	0	0	0	2	0	0	0	0
E02000371 : Hackney 027	2		1					0	1	0	0	0	0	0	2	0	0	0	0
E02000375 : Hammersmith and Fulham 004	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02000384 : Hammersmith and Fulham 013	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02000403 : Haringey 007	3		1					0	1	0	0	0	0	0	3	0	0	0	0
E02000408 : Haringey 012	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02000412 : Haringey 016	2		1					0	1	0	0	0	0	0	2	0	0	0	0
E02000418 : Haringey 022	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02000423 : Haringey 027	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02000428 : Haringey 032	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02000443 : Harrow 011	1	1	1					0.5	0.5	0	0	0	0	0.5	0.5	0	0	0	0
E02000448 : Harrow 016	1	1	1					0.5	0.5	0	0	0	0	0.5	0.5	0	0	0	0
E02000467 : Havering 004	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02000470 : Havering 007	3		1					0	1	0	0	0	0	0	3	0	0	0	0
E02000471 : Havering 008	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02000474 : Havering 011	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02000475 : Havering 012	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02000476 : Havering 013	5		1					0	1	0	0	0	0	0	5	0	0	0	0
E02000477 : Havering 014	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02000479 : Havering 016	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02000483 : Havering 020	2		1					0	1	0	0	0	0	0	2	0	0	0	0
E02000485 : Havering 022	2		1					0	1	0	0	0	0	0	2	0	0	0	0
E02000486 : Havering 023	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02000491 : Havering 028	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02000507 : Hillingdon 014	1	1	1					0.5	0.5	0	0	0	0	0.5	0.5	0	0	0	0
E02000518 : Hillingdon 025	1	1	1					0.5	0.5	0	0	0	0	0.5	0.5	0	0	0	0
E02000524 : Hillingdon 031	5	1	1					0.5	0.5	0	0	0	0	2.5	2.5	0	0	0	0
E02000531 : Hounslow 006	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02000557 : Islington 004	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02000559 : Islington 006	2		1					0	1	0	0	0	0	0	2	0	0	0	0
E02000560 : Islington 007	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02000568 : Islington 015	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02000569 : Islington 016	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02000571 : Islington 018	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02000573 : Islington 020	2		1					0	1	0	0	0	0	0	2	0	0	0	0
E02000574 : Islington 021	2		1					0	1	0	0	0	0	0	2	0	0	0	0
E02000575 : Islington 022	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02000576 : Islington 023	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02000590 : Kensington and Chelsea 014	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02000620 : Lambeth 003	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02000626 : Lambeth 009	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02000717 : Newham 004	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02000718 : Newham 005	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02000721 : Newham 008	2		1					0	1	0	0	0	0	0	2	0	0	0	0
E02000725 : Newham 012	2		1					0	1	0	0	0	0	0	2	0	0	0	0
E02000726 : Newham 013	4		1					0	1	0	0	0	0	0	4	0	0	0	0
E02000727 : Newham 014	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02000731 : Newham 018	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02000735 : Newham 022	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02000738 : Newham 025	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02000739 : Newham 026	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02000741 : Newham 028	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02000746 : Newham 033	4		1					0	1	0	0	0	0	0	4	0	0	0	0
E02000747 : Newham 034	3		1					0	1	0	0	0	0	0	3	0	0	0	0

E02000748 : Newham 035	4		1					0	1	0	0	0	0	0	4	0	0	0	0
E02000749 : Newham 036	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02000750 : Newham 037	2		1					0	1	0	0	0	0	0	2	0	0	0	0
E02000751 : Redbridge 001	5		1					0	1	0	0	0	0	0	5	0	0	0	0
E02000752 : Redbridge 002	5		1					0	1	0	0	0	0	0	5	0	0	0	0
E02000754 : Redbridge 004	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02000755 : Redbridge 005	2		1					0	1	0	0	0	0	0	2	0	0	0	0
E02000757 : Redbridge 007	2		1					0	1	0	0	0	0	0	2	0	0	0	0
E02000759 : Redbridge 009	3		1					0	1	0	0	0	0	0	3	0	0	0	0
E02000760 : Redbridge 010	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02000764 : Redbridge 014	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02000767 : Redbridge 017	3		1					0	1	0	0	0	0	0	3	0	0	0	0
E02000769 : Redbridge 019	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02000770 : Redbridge 020	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02000772 : Redbridge 022	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02000773 : Redbridge 023	2		1					0	1	0	0	0	0	0	2	0	0	0	0
E02000780 : Redbridge 030	3		1					0	1	0	0	0	0	0	3	0	0	0	0
E02000809 : Southwark 003	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02000814 : Southwark 008	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02000831 : Southwark 025	2		1					0	1	0	0	0	0	0	2	0	0	0	0
E02000864 : Tower Hamlets 001	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02000865 : Tower Hamlets 002	2		1					0	1	0	0	0	0	0	2	0	0	0	0
E02000868 : Tower Hamlets 005	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02000871 : Tower Hamlets 008	2		1					0	1	0	0	0	0	0	2	0	0	0	0
E02000875 : Tower Hamlets 012	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02000878 : Tower Hamlets 015	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02000883 : Tower Hamlets 020	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02000884 : Tower Hamlets 021	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02000886 : Tower Hamlets 023	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02000889 : Tower Hamlets 026	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02000890 : Tower Hamlets 027	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02000891 : Tower Hamlets 028	10		1					0	1	0	0	0	0	0	10	0	0	0	0
E02000895 : Waltham Forest 001	2		1					0	1	0	0	0	0	0	2	0	0	0	0
E02000896 : Waltham Forest 002	2		1					0	1	0	0	0	0	0	2	0	0	0	0
E02000897 : Waltham Forest 003	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02000898 : Waltham Forest 004	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02000899 : Waltham Forest 005	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02000900 : Waltham Forest 006	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02000901 : Waltham Forest 007	4		1					0	1	0	0	0	0	0	4	0	0	0	0
E02000905 : Waltham Forest 011	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02000906 : Waltham Forest 012	2		1					0	1	0	0	0	0	0	2	0	0	0	0
E02000907 : Waltham Forest 013	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02000908 : Waltham Forest 014	4		1					0	1	0	0	0	0	0	4	0	0	0	0
E02000910 : Waltham Forest 016	2		1					0	1	0	0	0	0	0	2	0	0	0	0
E02000911 : Waltham Forest 017	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02000912 : Waltham Forest 018	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02000913 : Waltham Forest 019	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02000914 : Waltham Forest 020	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02000916 : Waltham Forest 022	4		1					0	1	0	0	0	0	0	4	0	0	0	0
E02000917 : Waltham Forest 023	5		1					0	1	0	0	0	0	0	5	0	0	0	0
E02000919 : Waltham Forest 025	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02000920 : Waltham Forest 026	4		1					0	1	0	0	0	0	0	4	0	0	0	0
E02000924 : Wandsworth 002	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02000970 : Westminster 011	3		1					0	1	0	0	0	0	0	3	0	0	0	0
E02000972 : Westminster 013	4		1					0	1	0	0	0	0	0	4	0	0	0	0
E02000975 : Westminster 016	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02000977 : Westminster 018	7		1					0	1	0	0	0	0	0	7	0	0	0	0
E02000979 : Westminster 020	6		1					0	1	0	0	0	0	0	6	0	0	0	0
E02000983 : Westminster 024	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02001014 : Bolton 031	1	1						1	0	0	0	0	0	1	0	0	0	0	0
E02001260 : Trafford 002	1	1	1					0.5	0.5	0	0	0	0	0.5	0.5	0	0	0	0
E02001988 : Coventry 031	1	1	1					0.5	0.5	0	0	0	0	0.5	0.5	0	0	0	0

E02002062 : Sandwell 020	1	1	1					0.5	0.5	0	0	0	0	0.5	0.5	0	0	0	0
E02002089 : Solihull 009	1	1	1					0.5	0.5	0	0	0	0	0.5	0.5	0	0	0	0
E02002424 : Leeds 095	1	1						1	0	0	0	0	0	1	0	0	0	0	0
E02002593 : Warrington 004	1	1	1					0.5	0.5	0	0	0	0	0.5	0.5	0	0	0	0
E02002802 : Derby 007	1	1	1					0.5	0.5	0	0	0	0	0.5	0.5	0	0	0	0
E02002992 : Bath and North East Somerset (	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02003064 : Bristol 053	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02003197 : Poole 004	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02003225 : Swindon 014	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02003249 : Peterborough 013	1	1			1			0.5	0	0	0.5	0	0	0.5	0	0	0.5	0	0
E02003254 : Peterborough 018	2	1			1			0.5	0	0	0.5	0	0	1	0	0	1	0	0
E02003255 : Peterborough 019	1	1			1			0.5	0	0	0.5	0	0	0.5	0	0	0.5	0	0
E02003262 : Luton 005	1	1	1					0.5	0.5	0	0	0	0	0.5	0.5	0	0	0	0
E02003269 : Luton 012	1	1	1					0.5	0.5	0	0	0	0	0.5	0.5	0	0	0	0
E02003271 : Luton 014	17	1	1					0.5	0.5	0	0	0	0	8.5	8.5	0	0	0	0
E02003272 : Luton 015	1	1	1					0.5	0.5	0	0	0	0	0.5	0.5	0	0	0	0
E02003274 : Luton 017	1	1	1					0.5	0.5	0	0	0	0	0.5	0.5	0	0	0	0
E02003275 : Luton 018	1	1	1					0.5	0.5	0	0	0	0	0.5	0.5	0	0	0	0
E02003278 : Luton 021	5	1	1					0.5	0.5	0	0	0	0	2.5	2.5	0	0	0	0
E02003282 : Southend-on-Sea 004	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02003285 : Southend-on-Sea 007	2		1					0	1	0	0	0	0	0	2	0	0	0	0
E02003287 : Southend-on-Sea 009	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02003293 : Southend-on-Sea 015	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02003296 : Thurrock 001	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02003301 : Thurrock 006	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02003303 : Thurrock 008	2		1					0	1	0	0	0	0	0	2	0	0	0	0
E02003310 : Thurrock 015	2		1					0	1	0	0	0	0	0	2	0	0	0	0
E02003313 : Thurrock 018	3		1					0	1	0	0	0	0	0	3	0	0	0	0
E02003320 : Medway 007	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02003356 : Bracknell Forest 005	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02003360 : Bracknell Forest 009	2		1					0	1	0	0	0	0	0	2	0	0	0	0
E02003366 : Bracknell Forest 015	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02003385 : West Berkshire 019	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02003415 : Slough 009	2		1					0	1	0	0	0	0	0	2	0	0	0	0
E02003422 : Windsor and Maidenhead 002	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02003447 : Wokingham 009	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02003465 : Milton Keynes 007	2	1	1					0.5	0.5	0	0	0	0	1	1	0	0	0	0
E02003472 : Milton Keynes 014	3	1	1					0.5	0.5	0	0	0	0	1.5	1.5	0	0	0	0
E02003475 : Milton Keynes 017	1	1	1					0.5	0.5	0	0	0	0	0.5	0.5	0	0	0	0
E02003478 : Milton Keynes 020	1	1	1					0.5	0.5	0	0	0	0	0.5	0.5	0	0	0	0
E02003602 : Central Bedfordshire 004	2	1	1					0.5	0.5	0	0	0	0	1	1	0	0	0	0
E02003608 : Central Bedfordshire 010	1	1	1					0.5	0.5	0	0	0	0	0.5	0.5	0	0	0	0
E02003632 : Bedford 017	1	1						1	0	0	0	0	0	1	0	0	0	0	0
E02003634 : Bedford 019	1	1						1	0	0	0	0	0	1	0	0	0	0	0
E02003643 : Central Bedfordshire 024	2	1	1					0.5	0.5	0	0	0	0	1	1	0	0	0	0
E02003690 : South Bucks 003	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02003698 : Wycombe 003	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02003712 : Wycombe 017	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02003720 : Cambridge 002	1	1			1			0.5	0	0	0.5	0	0	0.5	0	0	0.5	0	0
E02003721 : Cambridge 003	7	1			1			0.5	0	0	0.5	0	0	3.5	0	0	3.5	0	0
E02003722 : Cambridge 004	3	1			1			0.5	0	0	0.5	0	0	1.5	0	0	1.5	0	0
E02003723 : Cambridge 005	4	1			1			0.5	0	0	0.5	0	0	2	0	0	2	0	0
E02003724 : Cambridge 006	2	1			1			0.5	0	0	0.5	0	0	1	0	0	1	0	0
E02003725 : Cambridge 007	15	1			1			0.5	0	0	0.5	0	0	7.5	0	0	7.5	0	0
E02003728 : Cambridge 010	4	1			1			0.5	0	0	0.5	0	0	2	0	0	2	0	0
E02003729 : Cambridge 011	2	1			1			0.5	0	0	0.5	0	0	1	0	0	1	0	0
E02003730 : Cambridge 012	11	1			1			0.5	0	0	0.5	0	0	5.5	0	0	5.5	0	0
E02003731 : Cambridge 013	25	1			1			0.5	0	0	0.5	0	0	12.5	0	0	12.5	0	0
E02003735 : East Cambridgeshire 004	1	1			1			0.5	0	0	0.5	0	0	0.5	0	0	0.5	0	0
E02003738 : East Cambridgeshire 007	2	1			1			0.5	0	0	0.5	0	0	1	0	0	1	0	0
E02003755 : Huntingdonshire 003	1	1			1			0.5	0	0	0.5	0	0	0.5	0	0	0.5	0	0
E02003757 : Huntingdonshire 005	1	1			1			0.5	0	0	0.5	0	0	0.5	0	0	0.5	0	0

E02003762 : Huntingdonshire 010	2	1			1			0.5	0	0	0.5	0	0	1	0	0	1	0	0
E02003764 : Huntingdonshire 012	2	1			1			0.5	0	0	0.5	0	0	1	0	0	1	0	0
E02003766 : Huntingdonshire 014	1	1			1			0.5	0	0	0.5	0	0	0.5	0	0	0.5	0	0
E02003777 : South Cambridgeshire 003	2	1			1			0.5	0	0	0.5	0	0	1	0	0	1	0	0
E02003778 : South Cambridgeshire 004	2	1			1			0.5	0	0	0.5	0	0	1	0	0	1	0	0
E02003781 : South Cambridgeshire 007	10	1			1			0.5	0	0	0.5	0	0	5	0	0	5	0	0
E02003783 : South Cambridgeshire 009	3	1			1			0.5	0	0	0.5	0	0	1.5	0	0	1.5	0	0
E02003785 : South Cambridgeshire 011	4	1			1			0.5	0	0	0.5	0	0	2	0	0	2	0	0
E02003786 : South Cambridgeshire 012	2	1			1			0.5	0	0	0.5	0	0	1	0	0	1	0	0
E02003787 : South Cambridgeshire 013	3	1			1			0.5	0	0	0.5	0	0	1.5	0	0	1.5	0	0
E02003788 : South Cambridgeshire 014	2	1			1			0.5	0	0	0.5	0	0	1	0	0	1	0	0
E02003789 : South Cambridgeshire 015	4	1			1			0.5	0	0	0.5	0	0	2	0	0	2	0	0
E02003790 : South Cambridgeshire 016	4	1			1			0.5	0	0	0.5	0	0	2	0	0	2	0	0
E02003791 : South Cambridgeshire 017	25	1			1			0.5	0	0	0.5	0	0	12.5	0	0	12.5	0	0
E02003792 : South Cambridgeshire 018	8	1			1			0.5	0	0	0.5	0	0	4	0	0	4	0	0
E02003793 : South Cambridgeshire 019	4	1			1			0.5	0	0	0.5	0	0	2	0	0	2	0	0
E02003864 : Cheshire East 012	1	1	1					0.5	0.5	0	0	0	0	0.5	0.5	0	0	0	0
E02004266 : Purbeck 004	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02004339 : County Durham 054	1	1	1					0.5	0.5	0	0	0	0	0.5	0.5	0	0	0	0
E02004435 : Basildon 012	6		1					0	1	0	0	0	0	0	6	0	0	0	0
E02004437 : Basildon 014	4		1					0	1	0	0	0	0	0	4	0	0	0	0
E02004438 : Basildon 015	3		1					0	1	0	0	0	0	0	3	0	0	0	0
E02004441 : Basildon 018	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02004443 : Basildon 020	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02004446 : Braintree 001	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02004447 : Braintree 002	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02004448 : Braintree 003	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02004449 : Braintree 004	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02004450 : Braintree 005	5		1					0	1	0	0	0	0	0	5	0	0	0	0
E02004451 : Braintree 006	3		1					0	1	0	0	0	0	0	3	0	0	0	0
E02004452 : Braintree 007	2		1					0	1	0	0	0	0	0	2	0	0	0	0
E02004453 : Braintree 008	8		1					0	1	0	0	0	0	0	8	0	0	0	0
E02004454 : Braintree 009	11		1					0	1	0	0	0	0	0	11	0	0	0	0
E02004455 : Braintree 010	7		1					0	1	0	0	0	0	0	7	0	0	0	0
E02004457 : Braintree 012	2		1					0	1	0	0	0	0	0	2	0	0	0	0
E02004458 : Braintree 013	4		1					0	1	0	0	0	0	0	4	0	0	0	0
E02004459 : Braintree 014	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02004461 : Braintree 016	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02004462 : Braintree 017	6		1					0	1	0	0	0	0	0	6	0	0	0	0
E02004463 : Braintree 018	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02004464 : Brentwood 001	2		1					0	1	0	0	0	0	0	2	0	0	0	0
E02004467 : Brentwood 004	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02004468 : Brentwood 005	3		1					0	1	0	0	0	0	0	3	0	0	0	0
E02004470 : Brentwood 007	3		1					0	1	0	0	0	0	0	3	0	0	0	0
E02004471 : Brentwood 008	6		1					0	1	0	0	0	0	0	6	0	0	0	0
E02004472 : Brentwood 009	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02004474 : Castle Point 002	3		1					0	1	0	0	0	0	0	3	0	0	0	0
E02004485 : Chelmsford 001	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02004486 : Chelmsford 002	3		1					0	1	0	0	0	0	0	3	0	0	0	0
E02004487 : Chelmsford 003	3		1					0	1	0	0	0	0	0	3	0	0	0	0
E02004488 : Chelmsford 004	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02004489 : Chelmsford 005	5		1					0	1	0	0	0	0	0	5	0	0	0	0
E02004492 : Chelmsford 008	3		1					0	1	0	0	0	0	0	3	0	0	0	0
E02004493 : Chelmsford 009	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02004494 : Chelmsford 010	30		1					0	1	0	0	0	0	0	30	0	0	0	0
E02004495 : Chelmsford 011	3		1					0	1	0	0	0	0	0	3	0	0	0	0
E02004498 : Chelmsford 014	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02004500 : Chelmsford 016	2		1					0	1	0	0	0	0	0	2	0	0	0	0
E02004506 : Colchester 001	2		1					0	1	0	0	0	0	0	2	0	0	0	0
E02004507 : Colchester 002	3		1					0	1	0	0	0	0	0	3	0	0	0	0
E02004509 : Colchester 004	2		1					0	1	0	0	0	0	0	2	0	0	0	0
E02004512 : Colchester 007	6		1					0	1	0	0	0	0	0	6	0	0	0	0

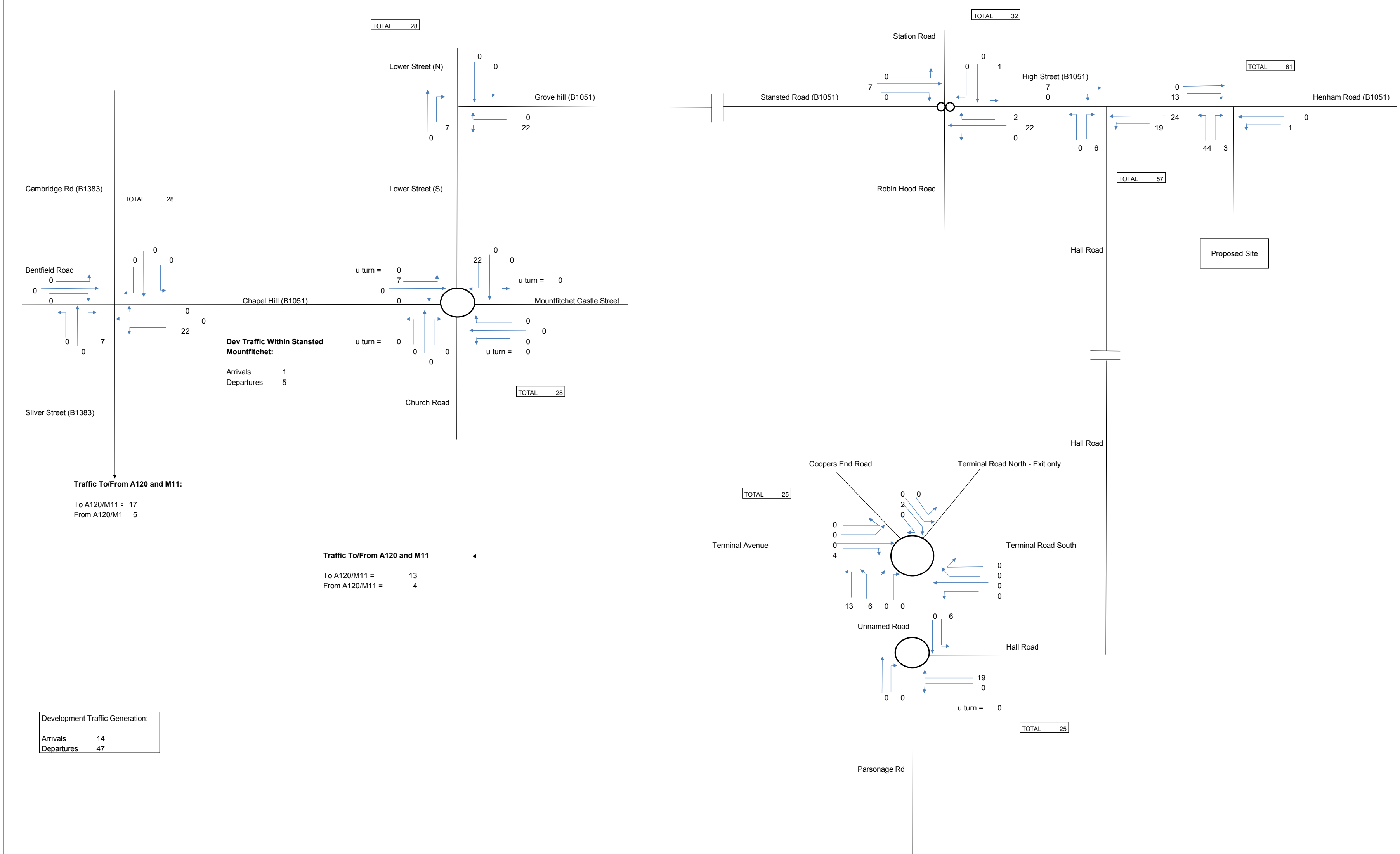
E02004515 : Colchester 010	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02004517 : Colchester 012	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02004519 : Colchester 014	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02004522 : Colchester 017	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02004527 : Epping Forest 001	28		1					0	1	0	0	0	0	0	28	0	0	0	0
E02004528 : Epping Forest 002	12		1					0	1	0	0	0	0	0	12	0	0	0	0
E02004529 : Epping Forest 003	3		1					0	1	0	0	0	0	0	3	0	0	0	0
E02004530 : Epping Forest 004	6		1					0	1	0	0	0	0	0	6	0	0	0	0
E02004531 : Epping Forest 005	22		1					0	1	0	0	0	0	0	22	0	0	0	0
E02004532 : Epping Forest 006	6		1					0	1	0	0	0	0	0	6	0	0	0	0
E02004534 : Epping Forest 008	9		1					0	1	0	0	0	0	0	9	0	0	0	0
E02004535 : Epping Forest 009	9		1					0	1	0	0	0	0	0	9	0	0	0	0
E02004536 : Epping Forest 010	3		1					0	1	0	0	0	0	0	3	0	0	0	0
E02004537 : Epping Forest 011	9		1					0	1	0	0	0	0	0	9	0	0	0	0
E02004538 : Epping Forest 012	6		1					0	1	0	0	0	0	0	6	0	0	0	0
E02004539 : Epping Forest 013	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02004540 : Epping Forest 014	2		1					0	1	0	0	0	0	0	2	0	0	0	0
E02004541 : Epping Forest 015	4		1					0	1	0	0	0	0	0	4	0	0	0	0
E02004542 : Epping Forest 016	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02004543 : Epping Forest 017	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02004544 : Harlow 001	17		1				1	0	0.5	0	0	0	0.5	0	8.5	0	0	0	8.5
E02004545 : Harlow 002	66	1	1					0.5	0.5	0	0	0	0	33	33	0	0	0	0
E02004546 : Harlow 003	19	1	1					0.5	0.5	0	0	0	0	9.5	9.5	0	0	0	0
E02004547 : Harlow 004	120	1	1					0.5	0.5	0	0	0	0	60	60	0	0	0	0
E02004548 : Harlow 005	5	1	1					0.5	0.5	0	0	0	0	2.5	2.5	0	0	0	0
E02004549 : Harlow 006	8	1	1					0.5	0.5	0	0	0	0	4	4	0	0	0	0
E02004550 : Harlow 007	36	1	1					0.5	0.5	0	0	0	0	18	18	0	0	0	0
E02004552 : Harlow 009	5	1	1					0.5	0.5	0	0	0	0	2.5	2.5	0	0	0	0
E02004553 : Harlow 010	8	1	1					0.5	0.5	0	0	0	0	4	4	0	0	0	0
E02004554 : Harlow 011	1	1	1					0.5	0.5	0	0	0	0	0.5	0.5	0	0	0	0
E02004558 : Maldon 004	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02004561 : Maldon 007	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02004565 : Rochford 003	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02004567 : Rochford 005	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02004568 : Rochford 006	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02004569 : Rochford 007	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02004573 : Tendring 001	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02004574 : Tendring 002	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02004575 : Tendring 003	3		1					0	1	0	0	0	0	0	3	0	0	0	0
E02004576 : Tendring 004	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02004577 : Tendring 005	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02004578 : Tendring 006	2		1					0	1	0	0	0	0	0	2	0	0	0	0
E02004579 : Tendring 007	2		1					0	1	0	0	0	0	0	2	0	0	0	0
E02004580 : Tendring 008	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02004582 : Tendring 010	3		1					0	1	0	0	0	0	0	3	0	0	0	0
E02004583 : Tendring 011	2		1					0	1	0	0	0	0	0	2	0	0	0	0
E02004585 : Tendring 013	2		1					0	1	0	0	0	0	0	2	0	0	0	0
E02004586 : Tendring 014	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02004588 : Tendring 016	6		1					0	1	0	0	0	0	0	6	0	0	0	0
E02004590 : Tendring 018	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02004591 : Uttlesford 001	56			1	1			0	0	0.5	0.5	0	0	0	0	28	28	0	0
E02004592 : Uttlesford 002	107			1	1			0	0	0.5	0.5	0	0	0	0	53.5	53.5	0	0
E02004593 : Uttlesford 003	71			1				0	0	1	0	0	0	0	0	71	0	0	0
E02004594 : Uttlesford 004	21			1				0	0	1	0	0	0	0	0	21	0	0	0
E02004595 : Uttlesford 005	310	1						1	0	0	0	0	0	310	0	0	0	0	0
E02004596 : Uttlesford 006	420					1		0	0	0	0	1	0	0	0	0	0	420	0
E02004597 : Uttlesford 007	49		1		1			0	0.5	0	0.5	0	0	0	24.5	0	24.5	0	0
E02004598 : Uttlesford 008	25		1		1			0	0.5	0	0.5	0	0	0	12.5	0	12.5	0	0
E02004599 : Uttlesford 009	50	1					1	0.5	0	0	0	0	0.5	25	0	0	0	0	25
E02004608 : Cheltenham 009	1	1	1					0.5	0.5	0	0	0	0	0.5	0.5	0	0	0	0
E02004610 : Cheltenham 011	1	1	1					0.5	0.5	0	0	0	0	0.5	0.5	0	0	0	0
E02004615 : Cotswold 001	1		1					0	1	0	0	0	0	0	1	0	0	0	0

E02004704 : East Hampshire 008	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02004816 : Test Valley 003	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02004843 : Broxbourne 001	1	1						1	0	0	0	0	0	1	0	0	0	0	0
E02004844 : Broxbourne 002	15	1						1	0	0	0	0	0	15	0	0	0	0	0
E02004845 : Broxbourne 003	19	1						1	0	0	0	0	0	19	0	0	0	0	0
E02004846 : Broxbourne 004	4	1	1					0.5	0.5	0	0	0	0	2	2	0	0	0	0
E02004847 : Broxbourne 005	3	1	1					0.5	0.5	0	0	0	0	1.5	1.5	0	0	0	0
E02004849 : Broxbourne 007	2	1	1					0.5	0.5	0	0	0	0	1	1	0	0	0	0
E02004850 : Broxbourne 008	4	1	1					0.5	0.5	0	0	0	0	2	2	0	0	0	0
E02004851 : Broxbourne 009	2	1	1					0.5	0.5	0	0	0	0	1	1	0	0	0	0
E02004852 : Broxbourne 010	10	1	1					0.5	0.5	0	0	0	0	5	5	0	0	0	0
E02004853 : Broxbourne 011	1	1	1					0.5	0.5	0	0	0	0	0.5	0.5	0	0	0	0
E02004854 : Broxbourne 012	3	1	1					0.5	0.5	0	0	0	0	1.5	1.5	0	0	0	0
E02004855 : Broxbourne 013	6	1	1					0.5	0.5	0	0	0	0	3	3	0	0	0	0
E02004865 : Dacorum 010	1	1	1					0.5	0.5	0	0	0	0	0.5	0.5	0	0	0	0
E02004872 : Dacorum 017	1	1	1					0.5	0.5	0	0	0	0	0.5	0.5	0	0	0	0
E02004876 : Dacorum 021	1	1	1					0.5	0.5	0	0	0	0	0.5	0.5	0	0	0	0
E02004878 : East Hertfordshire 001	15	1						1	0	0	0	0	0	15	0	0	0	0	0
E02004879 : East Hertfordshire 002	4	1						1	0	0	0	0	0	4	0	0	0	0	0
E02004880 : East Hertfordshire 003	105	1						1	0	0	0	0	0	105	0	0	0	0	0
E02004881 : East Hertfordshire 004	236	1						1	0	0	0	0	0	236	0	0	0	0	0
E02004882 : East Hertfordshire 005	178	1						1	0	0	0	0	0	178	0	0	0	0	0
E02004883 : East Hertfordshire 006	7	1						1	0	0	0	0	0	7	0	0	0	0	0
E02004884 : East Hertfordshire 007	99	1						1	0	0	0	0	0	99	0	0	0	0	0
E02004885 : East Hertfordshire 008	39	1						1	0	0	0	0	0	39	0	0	0	0	0
E02004886 : East Hertfordshire 009	31	1						1	0	0	0	0	0	31	0	0	0	0	0
E02004887 : East Hertfordshire 010	3	1						1	0	0	0	0	0	3	0	0	0	0	0
E02004888 : East Hertfordshire 011	40	1						1	0	0	0	0	0	40	0	0	0	0	0
E02004889 : East Hertfordshire 012	9	1						1	0	0	0	0	0	9	0	0	0	0	0
E02004890 : East Hertfordshire 013	30	1						1	0	0	0	0	0	30	0	0	0	0	0
E02004891 : East Hertfordshire 014	1	1						1	0	0	0	0	0	1	0	0	0	0	0
E02004893 : East Hertfordshire 016	10	1						1	0	0	0	0	0	10	0	0	0	0	0
E02004894 : East Hertfordshire 017	23	1						1	0	0	0	0	0	23	0	0	0	0	0
E02004895 : East Hertfordshire 018	8	1						1	0	0	0	0	0	8	0	0	0	0	0
E02004896 : Hertsmere 001	2	1	1					0.5	0.5	0	0	0	0	1	1	0	0	0	0
E02004899 : Hertsmere 004	2	1	1					0.5	0.5	0	0	0	0	1	1	0	0	0	0
E02004906 : Hertsmere 011	4	1	1					0.5	0.5	0	0	0	0	2	2	0	0	0	0
E02004907 : Hertsmere 012	1	1	1					0.5	0.5	0	0	0	0	0.5	0.5	0	0	0	0
E02004909 : North Hertfordshire 001	1	1						1	0	0	0	0	0	1	0	0	0	0	0
E02004910 : North Hertfordshire 002	8	1						1	0	0	0	0	0	8	0	0	0	0	0
E02004913 : North Hertfordshire 005	2	1						1	0	0	0	0	0	2	0	0	0	0	0
E02004914 : North Hertfordshire 006	2	1						1	0	0	0	0	0	2	0	0	0	0	0
E02004915 : North Hertfordshire 007	1	1						1	0	0	0	0	0	1	0	0	0	0	0
E02004916 : North Hertfordshire 008	3	1						1	0	0	0	0	0	3	0	0	0	0	0
E02004918 : North Hertfordshire 010	1	1						1	0	0	0	0	0	1	0	0	0	0	0
E02004920 : North Hertfordshire 012	2	1						1	0	0	0	0	0	2	0	0	0	0	0
E02004933 : St Albans 010	3	1	1					0.5	0.5	0	0	0	0	1.5	1.5	0	0	0	0
E02004934 : St Albans 011	1	1	1					0.5	0.5	0	0	0	0	0.5	0.5	0	0	0	0
E02004935 : St Albans 012	6	1	1					0.5	0.5	0	0	0	0	3	3	0	0	0	0
E02004937 : St Albans 014	2	1	1					0.5	0.5	0	0	0	0	1	1	0	0	0	0
E02004938 : St Albans 015	2	1	1					0.5	0.5	0	0	0	0	1	1	0	0	0	0
E02004939 : St Albans 016	1	1	1					0.5	0.5	0	0	0	0	0.5	0.5	0	0	0	0
E02004940 : St Albans 017	2	1	1					0.5	0.5	0	0	0	0	1	1	0	0	0	0
E02004942 : St Albans 019	1	1	1					0.5	0.5	0	0	0	0	0.5	0.5	0	0	0	0
E02004943 : St Albans 020	1	1	1					0.5	0.5	0	0	0	0	0.5	0.5	0	0	0	0
E02004945 : Stevenage 002	6	1						1	0	0	0	0	0	6	0	0	0	0	0
E02004948 : Stevenage 005	3	1		1				0.5	0	0.5	0	0	0	1.5	0	1.5	0	0	0
E02004951 : Stevenage 008	13	1						1	0	0	0	0	0	13	0	0	0	0	0
E02004954 : Stevenage 011	7	1						1	0	0	0	0	0	7	0	0	0	0	0
E02004957 : Three Rivers 002	2	1	1					0.5	0.5	0	0	0	0	1	1	0	0	0	0
E02004964 : Three Rivers 009	1	1	1					0.5	0.5	0	0	0	0	0.5	0.5	0	0	0	0
E02004976 : Watford 009	2	1	1					0.5	0.5	0	0	0	0	1	1	0	0	0	0

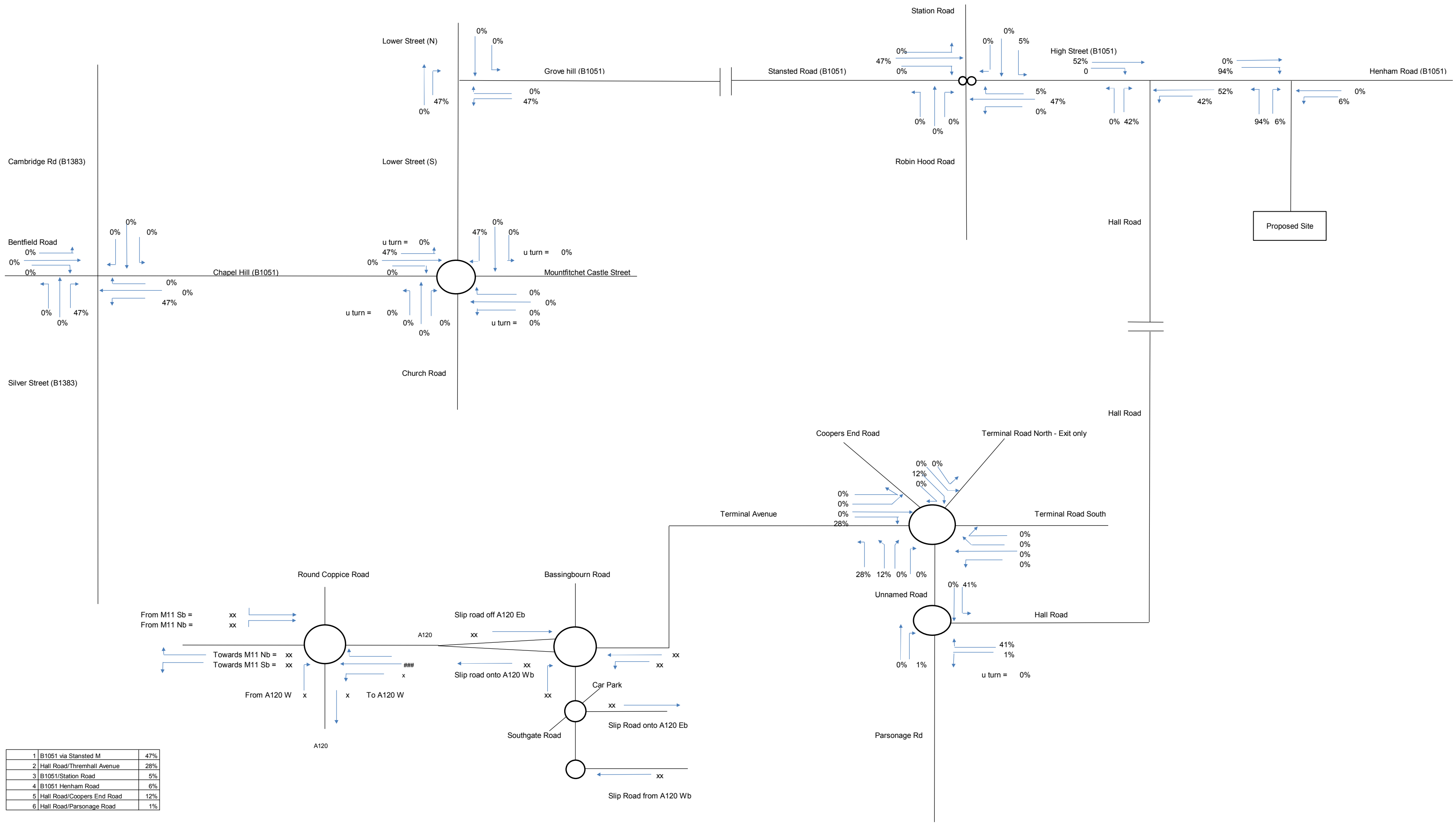
E02004978 : Watford 011	1	1	1					0.5	0.5	0	0	0	0	0.5	0.5	0	0	0	0
E02004981 : Welwyn Hatfield 002	1	1	1					0.5	0.5	0	0	0	0	0.5	0.5	0	0	0	0
E02004983 : Welwyn Hatfield 004	4	1	1					0.5	0.5	0	0	0	0	2	2	0	0	0	0
E02004985 : Welwyn Hatfield 006	5	1	1					0.5	0.5	0	0	0	0	2.5	2.5	0	0	0	0
E02004986 : Welwyn Hatfield 007	5	1	1					0.5	0.5	0	0	0	0	2.5	2.5	0	0	0	0
E02004987 : Welwyn Hatfield 008	1	1	1					0.5	0.5	0	0	0	0	0.5	0.5	0	0	0	0
E02004989 : Welwyn Hatfield 010	6	1	1					0.5	0.5	0	0	0	0	3	3	0	0	0	0
E02004990 : Welwyn Hatfield 011	1	1	1					0.5	0.5	0	0	0	0	0.5	0.5	0	0	0	0
E02004991 : Welwyn Hatfield 012	1	1	1					0.5	0.5	0	0	0	0	0.5	0.5	0	0	0	0
E02004993 : Welwyn Hatfield 014	3	1	1					0.5	0.5	0	0	0	0	1.5	1.5	0	0	0	0
E02004995 : Welwyn Hatfield 016	3	1	1					0.5	0.5	0	0	0	0	1.5	1.5	0	0	0	0
E02005001 : Ashford 006	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02005033 : Dartford 006	2		1					0	1	0	0	0	0	0	2	0	0	0	0
E02005042 : Dover 002	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02005046 : Dover 006	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02005069 : Maidstone 002	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02005094 : Sevenoaks 008	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02005155 : Tonbridge and Malling 007	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02005160 : Tonbridge and Malling 012	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02005338 : Blaby 006	1	1	1					0.5	0.5	0	0	0	0	0.5	0.5	0	0	0	0
E02005406 : North West Leicestershire 010	1	1	1					0.5	0.5	0	0	0	0	0.5	0.5	0	0	0	0
E02005409 : North West Leicestershire 013	2	1	1					0.5	0.5	0	0	0	0	1	1	0	0	0	0
E02005412 : Oadby and Wigston 003	1	1	1					0.5	0.5	0	0	0	0	0.5	0.5	0	0	0	0
E02005439 : East Lindsey 016	1	1	1					0.5	0.5	0	0	0	0	0.5	0.5	0	0	0	0
E02005484 : South Kesteven 009	2	1						1	0	0	0	0	0	2	0	0	0	0	0
E02005575 : North Norfolk 006	1	1			1			0.5	0	0	0.5	0	0	0.5	0	0	0.5	0	0
E02005584 : Norwich 001	1		1		1			0	0.5	0	0.5	0	0	0	0.5	0	0.5	0	0
E02005645 : Kettering 007	1	1						1	0	0	0	0	0	1	0	0	0	0	0
E02005673 : Northampton 024	2	1	1					0.5	0.5	0	0	0	0	1	1	0	0	0	0
E02005695 : Wellingborough 004	1	1						1	0	0	0	0	0	1	0	0	0	0	0
E02005939 : Cherwell 019	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02005954 : Oxford 015	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02005968 : South Oxfordshire 011	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02006034 : Shropshire 020	1	1	1					0.5	0.5	0	0	0	0	0.5	0.5	0	0	0	0
E02006230 : Babergh 004	1		1		1			0	0.5	0	0.5	0	0	0	0.5	0	0.5	0	0
E02006233 : Babergh 007	1		1		1			0	0.5	0	0.5	0	0	0	0.5	0	0.5	0	0
E02006234 : Babergh 008	1		1		1			0	0.5	0	0.5	0	0	0	0.5	0	0.5	0	0
E02006235 : Babergh 009	2		1		1			0	0.5	0	0.5	0	0	0	1	0	1	0	0
E02006237 : Babergh 011	1		1		1			0	0.5	0	0.5	0	0	0	0.5	0	0.5	0	0
E02006240 : Forest Heath 003	1	1			1			0.5	0	0	0.5	0	0	0.5	0	0	0.5	0	0
E02006241 : Forest Heath 004	1	1			1			0.5	0	0	0.5	0	0	0.5	0	0	0.5	0	0
E02006243 : Forest Heath 006	1	1			1			0.5	0	0	0.5	0	0	0.5	0	0	0.5	0	0
E02006246 : Ipswich 002	1		1		1			0	0.5	0	0.5	0	0	0	0.5	0	0.5	0	0
E02006266 : Mid Suffolk 006	1		1		1			0	0.5	0	0.5	0	0	0	0.5	0	0.5	0	0
E02006271 : Mid Suffolk 011	3		1		1			0	0.5	0	0.5	0	0	0	1.5	0	1.5	0	0
E02006277 : St Edmundsbury 005	1	1			1			0.5	0	0	0.5	0	0	0.5	0	0	0.5	0	0
E02006279 : St Edmundsbury 007	1	1			1			0.5	0	0	0.5	0	0	0.5	0	0	0.5	0	0
E02006280 : St Edmundsbury 008	1	1			1			0.5	0	0	0.5	0	0	0.5	0	0	0.5	0	0
E02006281 : St Edmundsbury 009	1	1			1			0.5	0	0	0.5	0	0	0.5	0	0	0.5	0	0
E02006283 : St Edmundsbury 011	1	1			1			0.5	0	0	0.5	0	0	0.5	0	0	0.5	0	0
E02006284 : St Edmundsbury 012	1	1			1			0.5	0	0	0.5	0	0	0.5	0	0	0.5	0	0
E02006286 : St Edmundsbury 014	9	1			1			0.5	0	0	0.5	0	0	4.5	0	0	4.5	0	0
E02006345 : Guildford 002	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02006350 : Guildford 007	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02006457 : Woking 002	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02006492 : Rugby 001	2	1	1					0.5	0.5	0	0	0	0	1	1	0	0	0	0
E02006494 : Rugby 003	1	1	1					0.5	0.5	0	0	0	0	0.5	0.5	0	0	0	0
E02006575 : Crawley 001	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02006610 : Mid Sussex 007	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02006615 : Mid Sussex 012	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02006700 : Bromsgrove 005	1	1	1					0.5	0.5	0	0	0	0	0.5	0.5	0	0	0	0
E02006801 : Lambeth 036	3		1					0	1	0	0	0	0	0	3	0	0	0	0

E02006825 : East Cambridgeshire 011	1	1			1			0.5	0	0	0.5	0	0	0.5	0	0	0.5	0	0
E02006826 : Forest Heath 008	1	1			1			0.5	0	0	0.5	0	0	0.5	0	0	0.5	0	0
E02006853 : Tower Hamlets 032	2		1					0	1	0	0	0	0	0	2	0	0	0	0
E02006854 : Tower Hamlets 033	41		1					0	1	0	0	0	0	0	41	0	0	0	0
E02006873 : South Cambridgeshire 020	1	1			1			0.5	0	0	0.5	0	0	0.5	0	0	0.5	0	0
E02006874 : South Cambridgeshire 021	1	1			1			0.5	0	0	0.5	0	0	0.5	0	0	0.5	0	0
E02006907 : Norwich 014	2		1		1			0	0.5	0	0.5	0	0	0	1	0	1	0	0
E02006924 : Redbridge 035	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02006925 : Redbridge 036	6		1					0	1	0	0	0	0	0	6	0	0	0	0
E02006928 : Greenwich 035	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02006929 : Greenwich 036	1		1					0	1	0	0	0	0	0	1	0	0	0	0
E02006931 : Greenwich 038	1		1					0	1	0	0	0	0	0	1	0	0	0	0
W02000226 : Bridgend 009	1	1	1					0.5	0.5	0	0	0	0	0.5	0.5	0	0	0	0
TOTAL	**3,425**													1603	976	175	218	420	34
														47%	28%	5%	6%	12%	1%

Appendix C



ARDENT CONSULTING ENGINEERS Third Floor, The Hallmark Building 52-56 Leadenhall Street London EC3M 5JE	Client **Countryside**		Project **Land South of Henham Road, Elsenham**
	Date **July 2022**	Job No **2008170**	Drawing No
	Proposed Development Flows - AM Peak		



1	B1051 via Stansted M	47%
2	Hall Road/Thremhall Avenue	28%
3	B1051/Station Road	5%
4	B1051 Henham Road	6%
5	Hall Road/Coopers End Road	12%
6	Hall Road/Parsonage Road	1%

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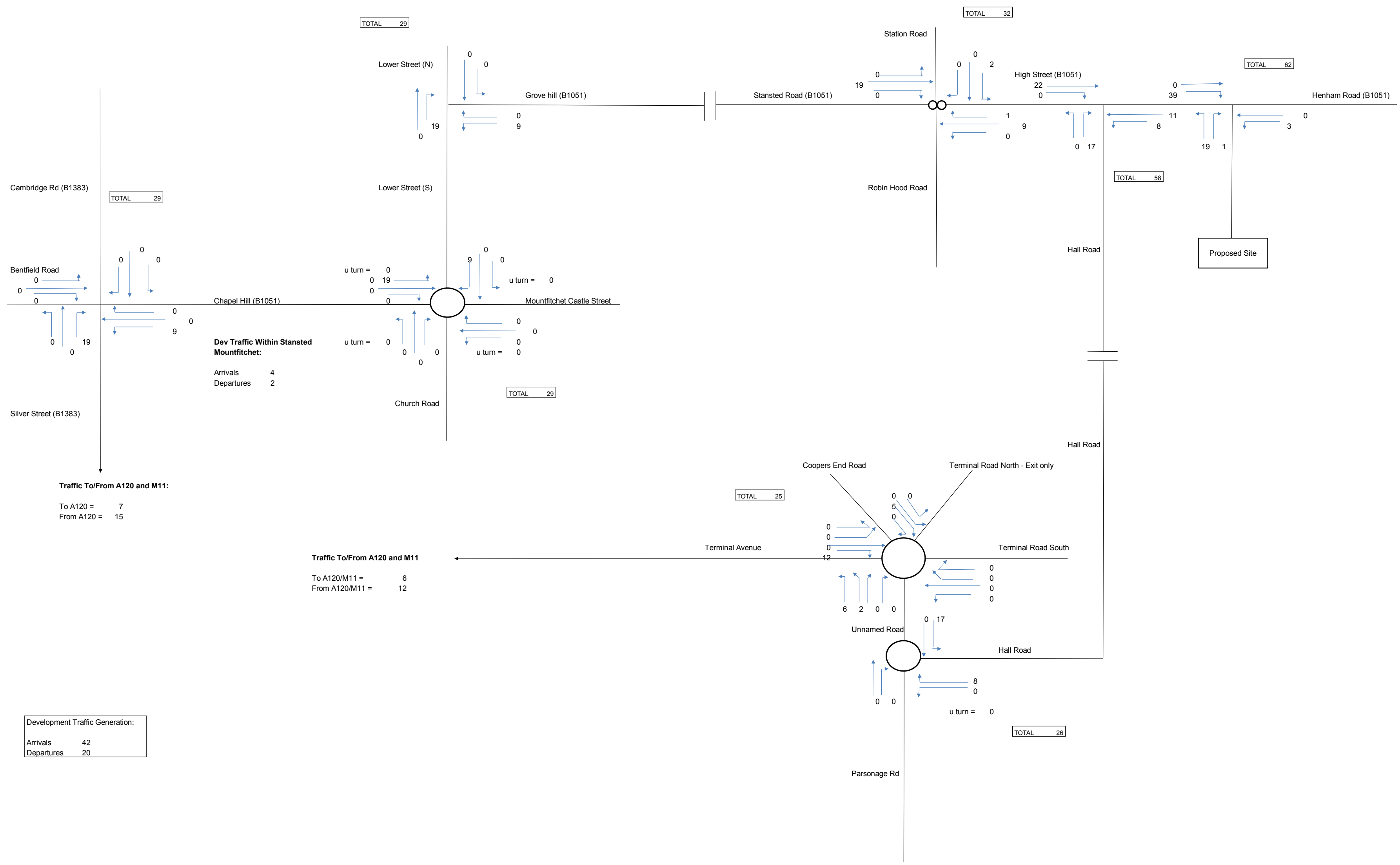
Project: **Land South of Henham Road, Elsenham**
Date: **July 2022**
Job No: **2008170**
Drawing No

Traffic Distribution



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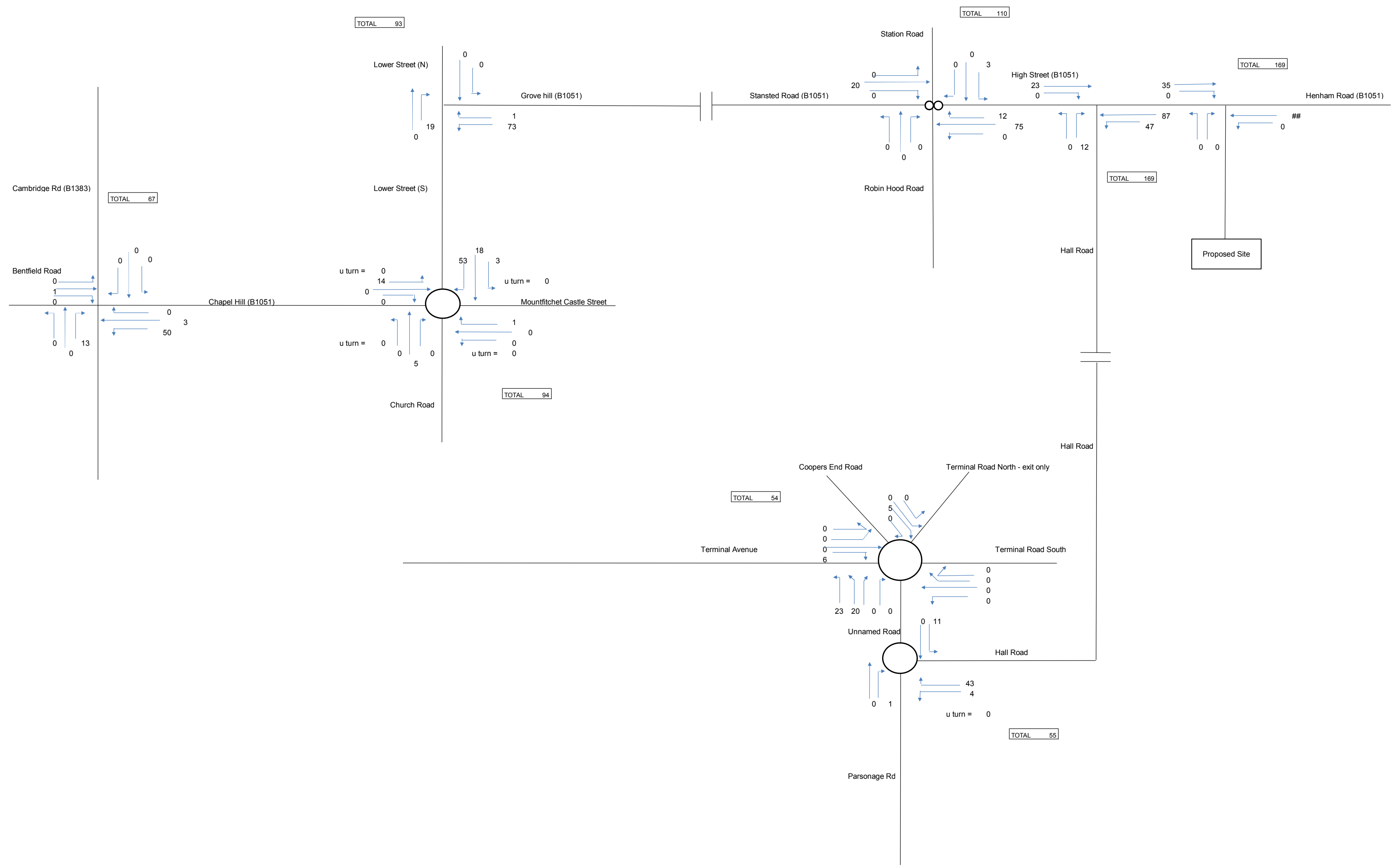
London EC3M 5JE

Client: **Countryside**		Project: **Land South of Henham Road, Elsenham**	
Date: **July 2022**	Job No: **2008170**		Drawing No
Proposed Development Flows - PM Peak			

Appendix D



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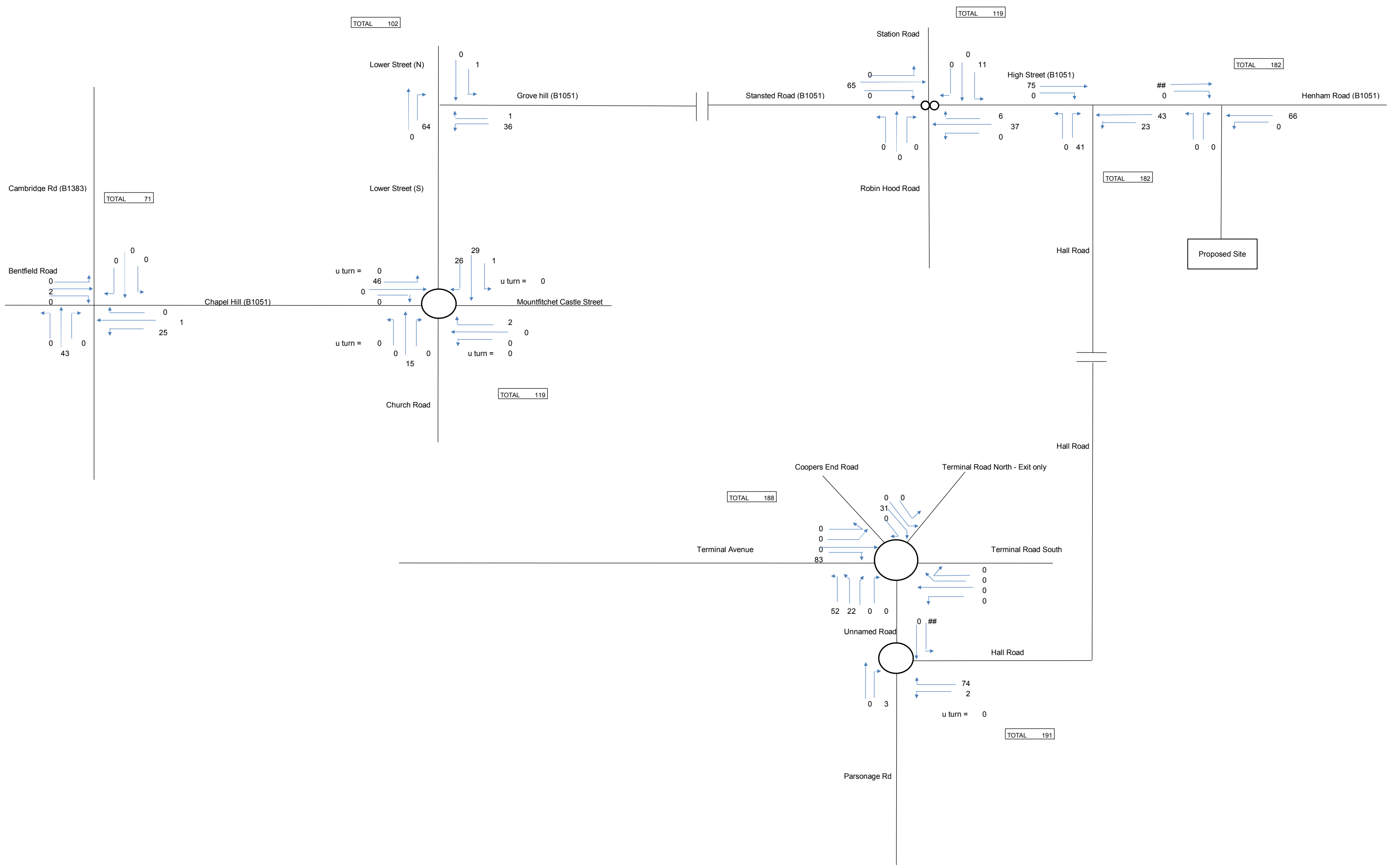
Client		Project	
Countryside		**Land South of Henham Road, Elsenham**	
Date	Job No		Drawing No
July 2022	**2008170**		

Committed Development Flows (E Elsenham - 350 dwellings) - AM Peak



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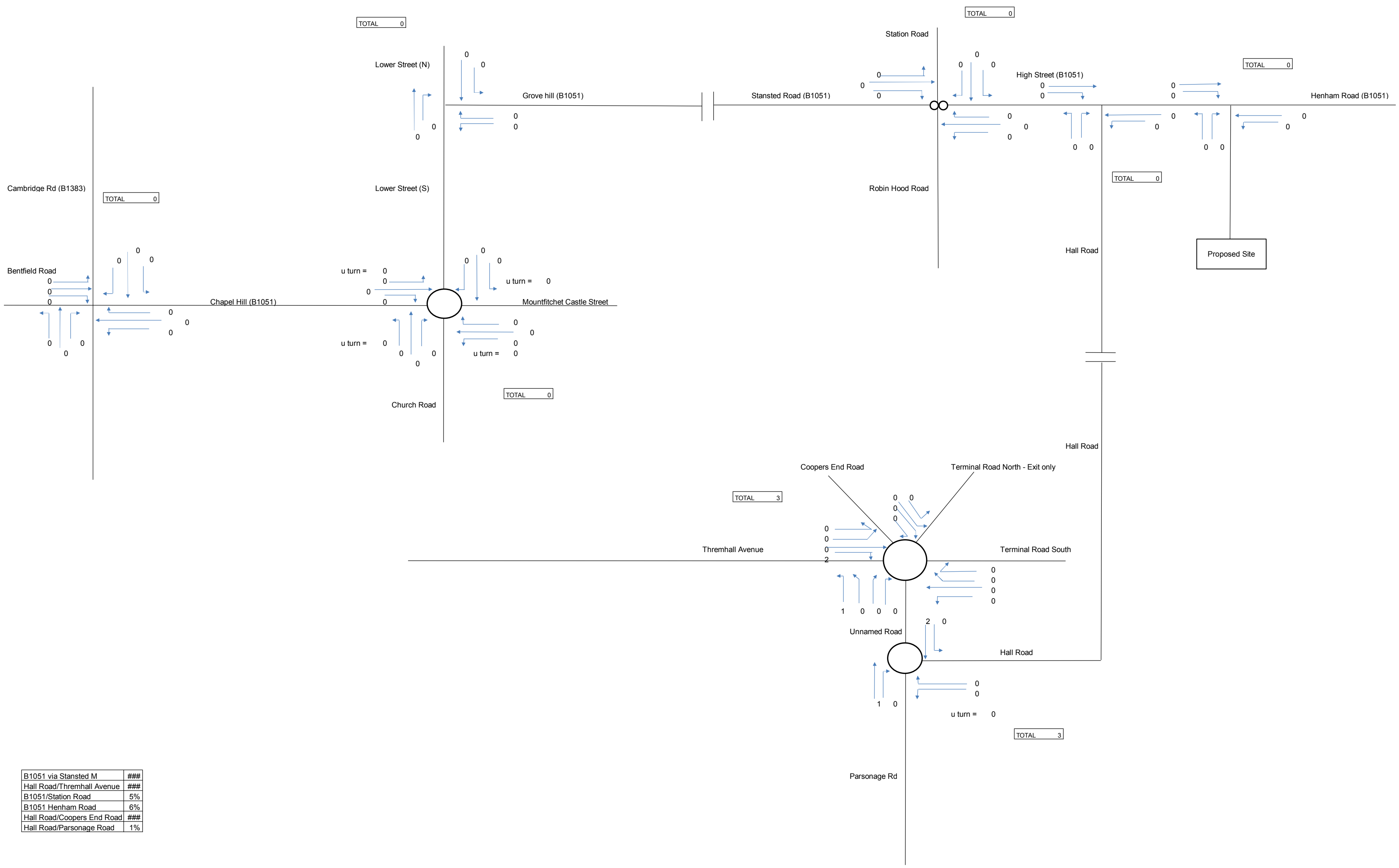
London EC3M 5JE

Client: **Countryside**		Project: **Land South of Henham Road, Elsenham**
Date: **July 2022**	Job No: **2008170**	Drawing No
Committed Development Flows (E Elsenham - 350 dwellings) - PM Peak		



B1051 via Stansted M	###
Hall Road/Thremhall Avenue	###
B1051/Station Road	5%
B1051 Henham Road	6%
Hall Road/Coopers End Road	###
Hall Road/Parsonage Road	1%

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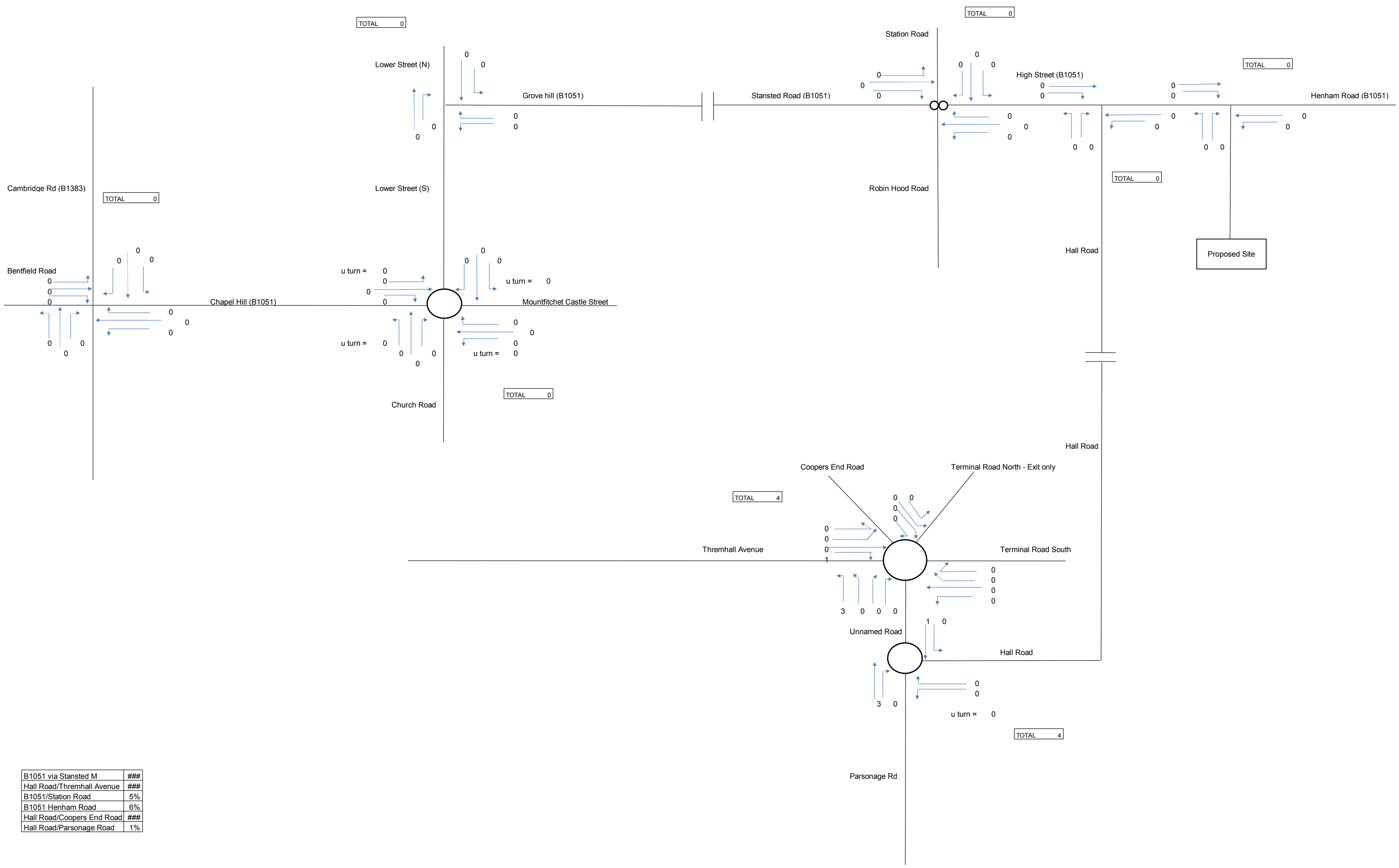
Client	Project
Countryside	**Land South of Henham Road, Elsenham**

Date	Job No	Drawing No
July 2022	**2008170**	

Committed Development Flows (E of Parsonage Road - 66 Bed Care Home) - AM Peak



B1051 via Stansted M	###
Hall Road/Thremhall Avenue	###
B1051/Station Road	5%
B1051 Henham Road	6%
Hall Road/Coopers End Road	###
Hall Road/Parsonage Road	1%

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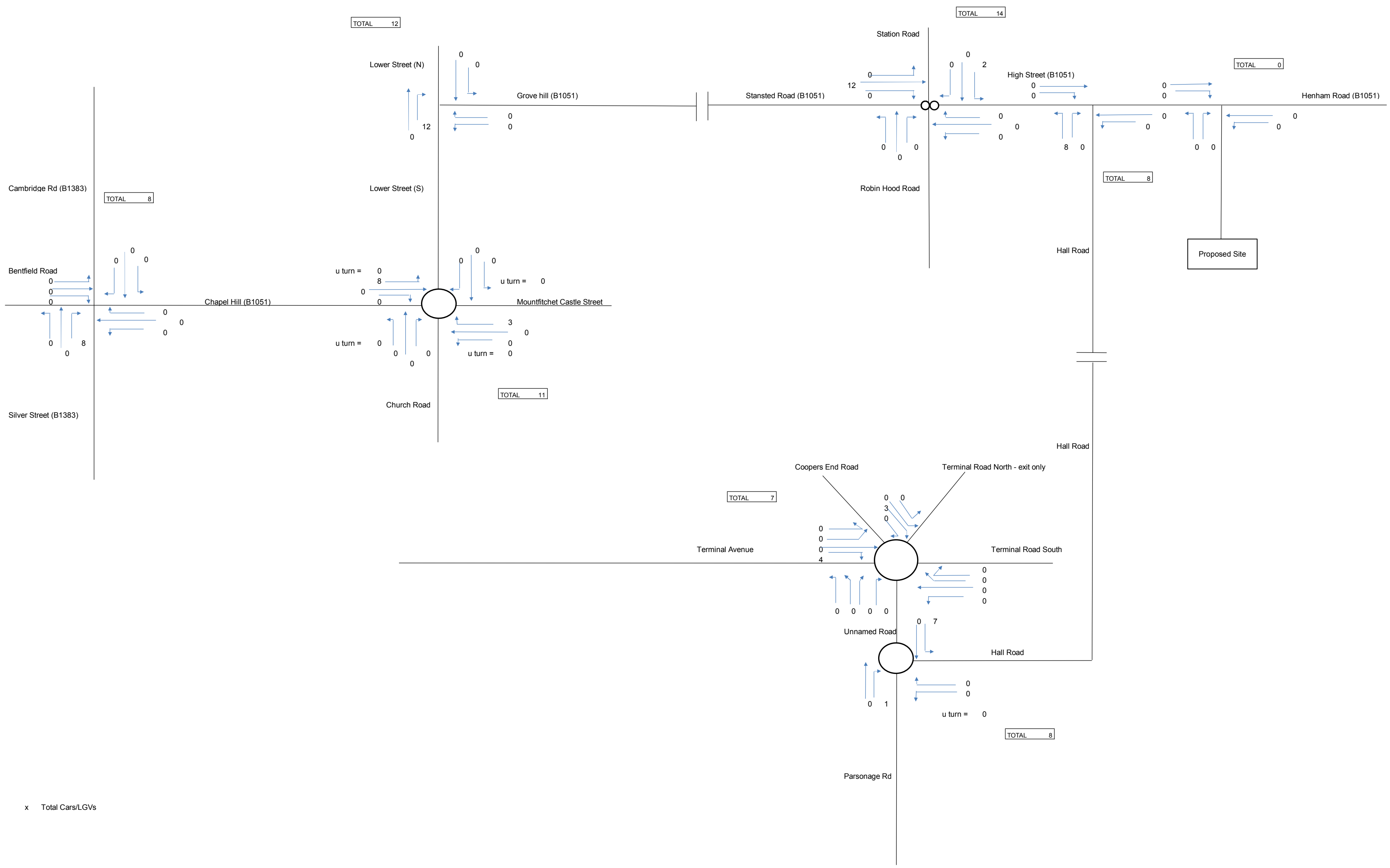
52-56 Leadenhall Street
London EC3M 5JE

Client	Project
Countryside	**Land South of Henham Road, Elsenham**

Date	Job No	Drawing No
July 2022	**2008170**	

Committed Development Flows (E of Parsonage Road - 66 Bed Care Home) - PM Peak



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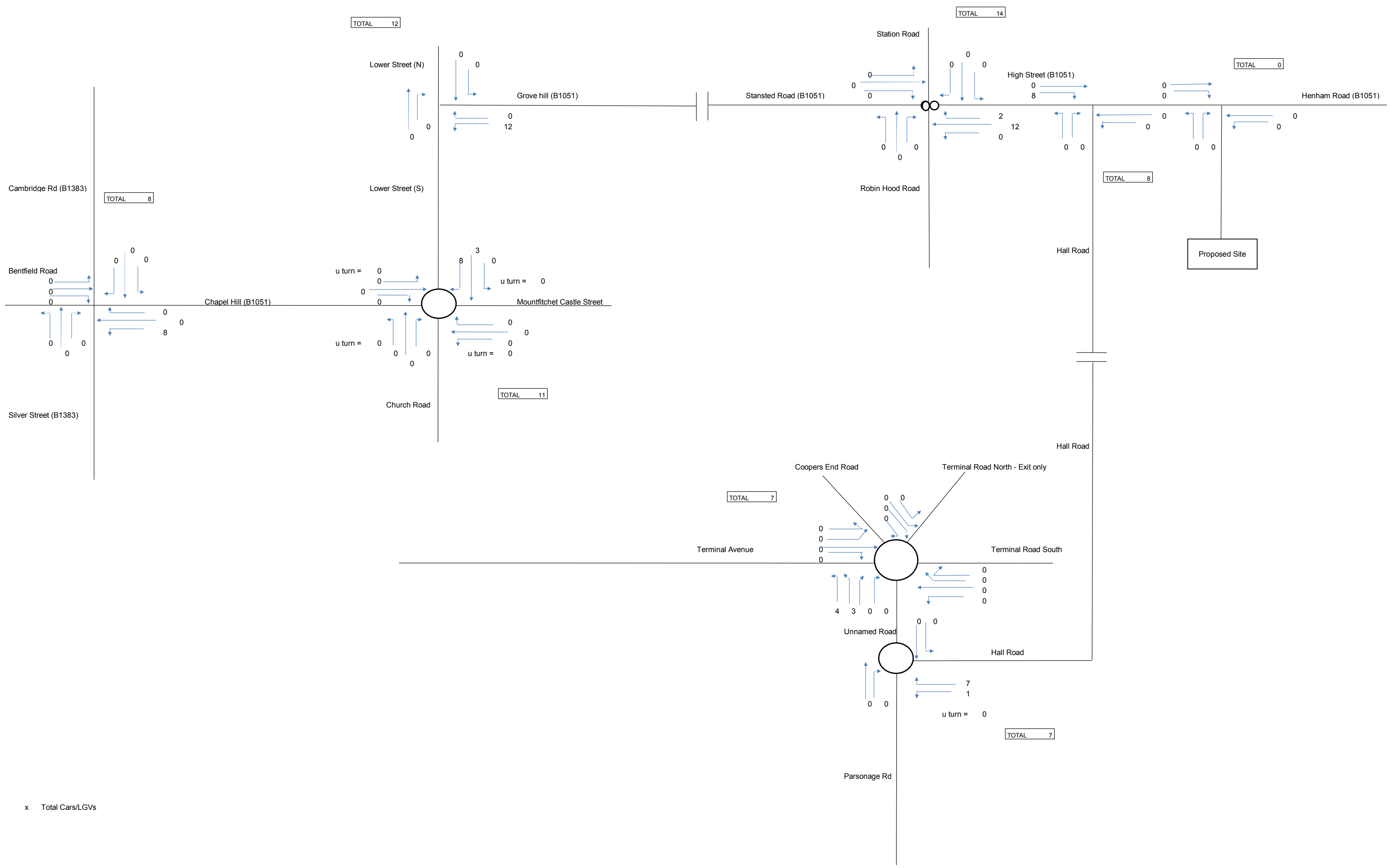
London EC3M 5JE

Client	Project
Countryside	**Land South of Henham Road, Elsenham**

Date	Job No	Drawing No
July 2022	**2008170**	

Committed Development Flows (Elsenham Primary School) - AM Peak



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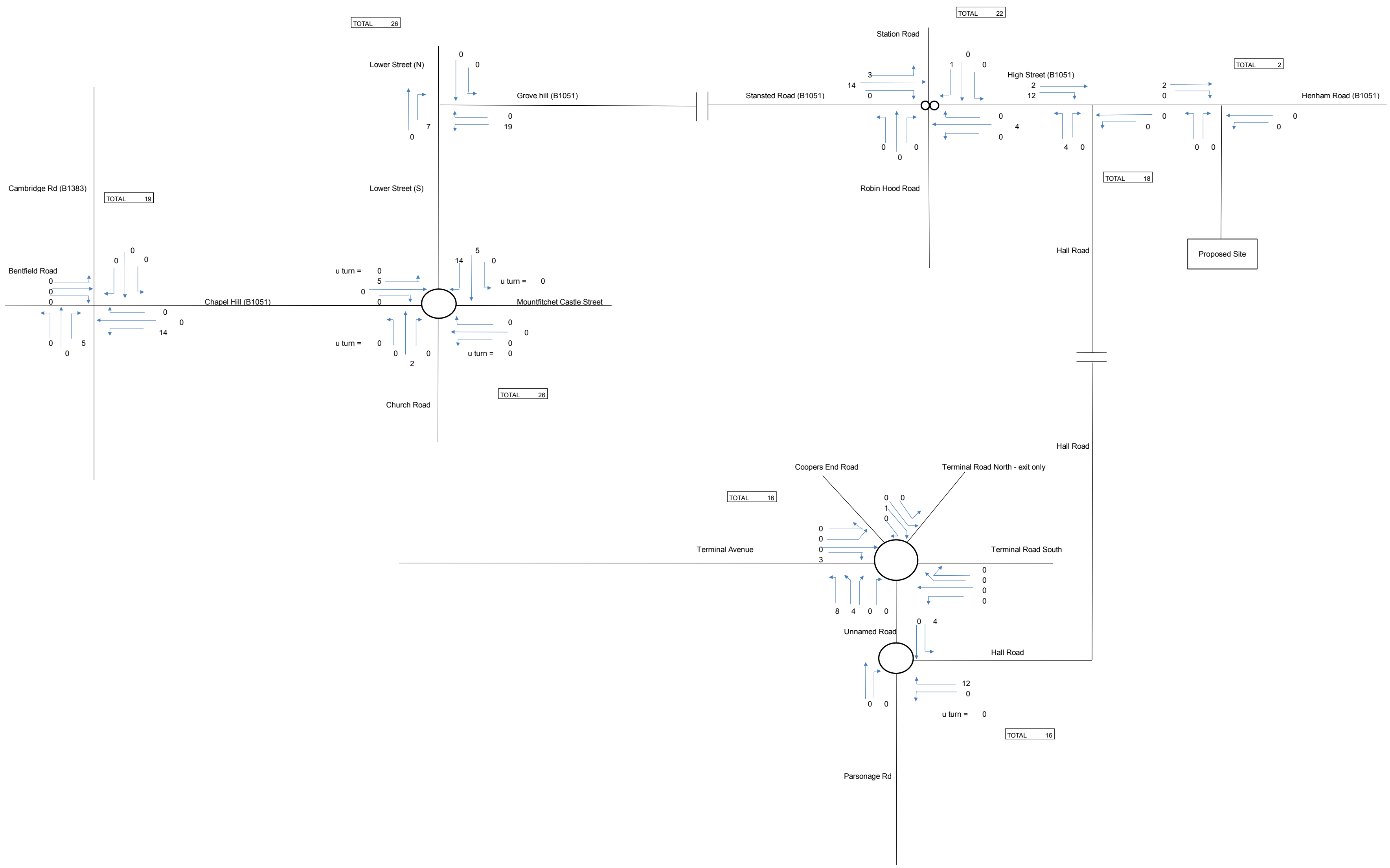
London EC3M 5JE

Client: **Countryside**		Project: **Land South of Henham Road, Elsenham**	
Date: **July 2022**	Job No: **2008170**		Drawing No
Committed Development Flows (Elsenham Primary School) - PM Peak			



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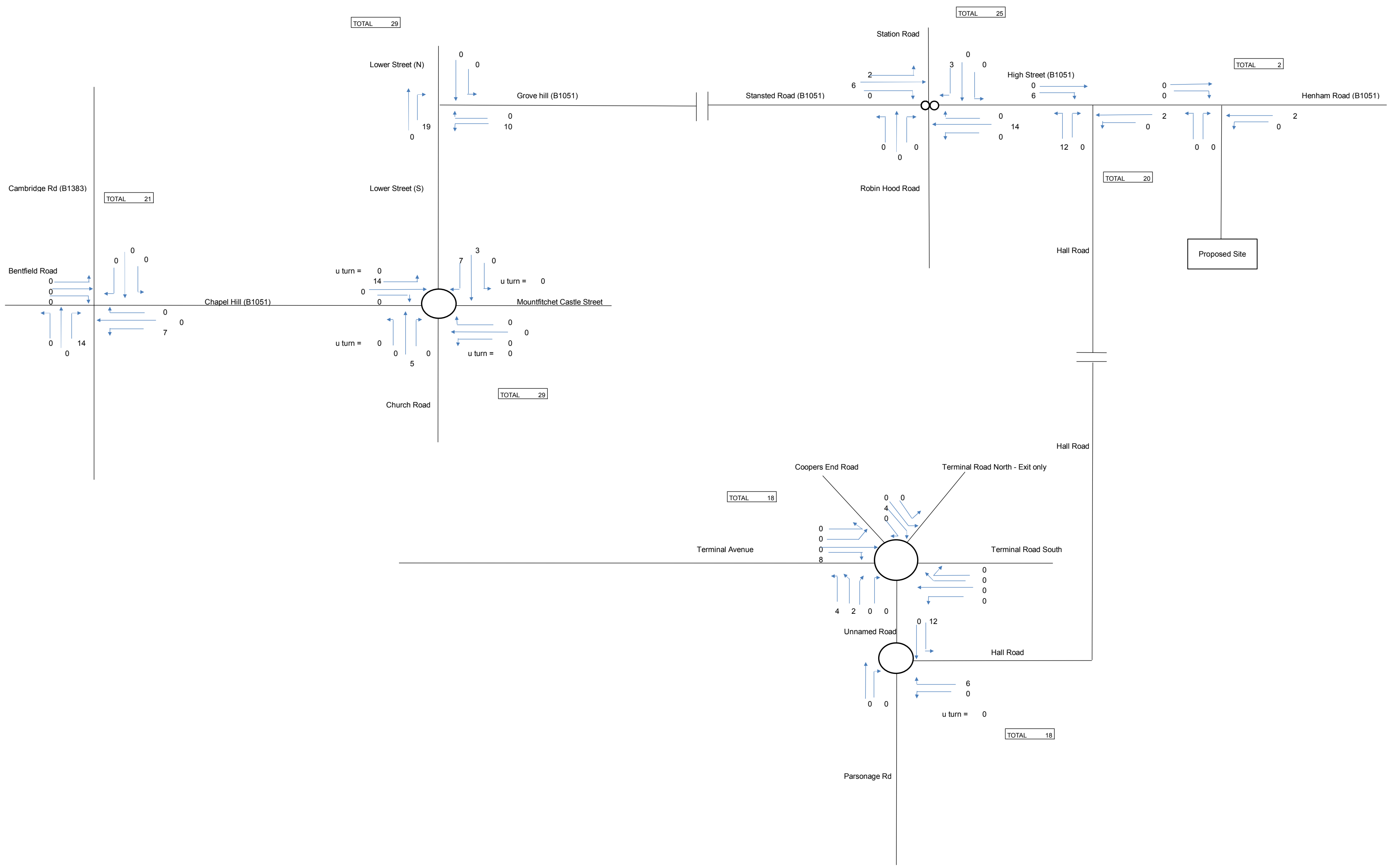
London EC3M 5JE

Client: **Countryside**		Project: **Land South of Henham Road, Elsenham**	
Date: **July 2022**	Job No: **2008170**		Drawing No
Committed Development Flows (Isabel Drive - 99 dwellings) - AM Peak			



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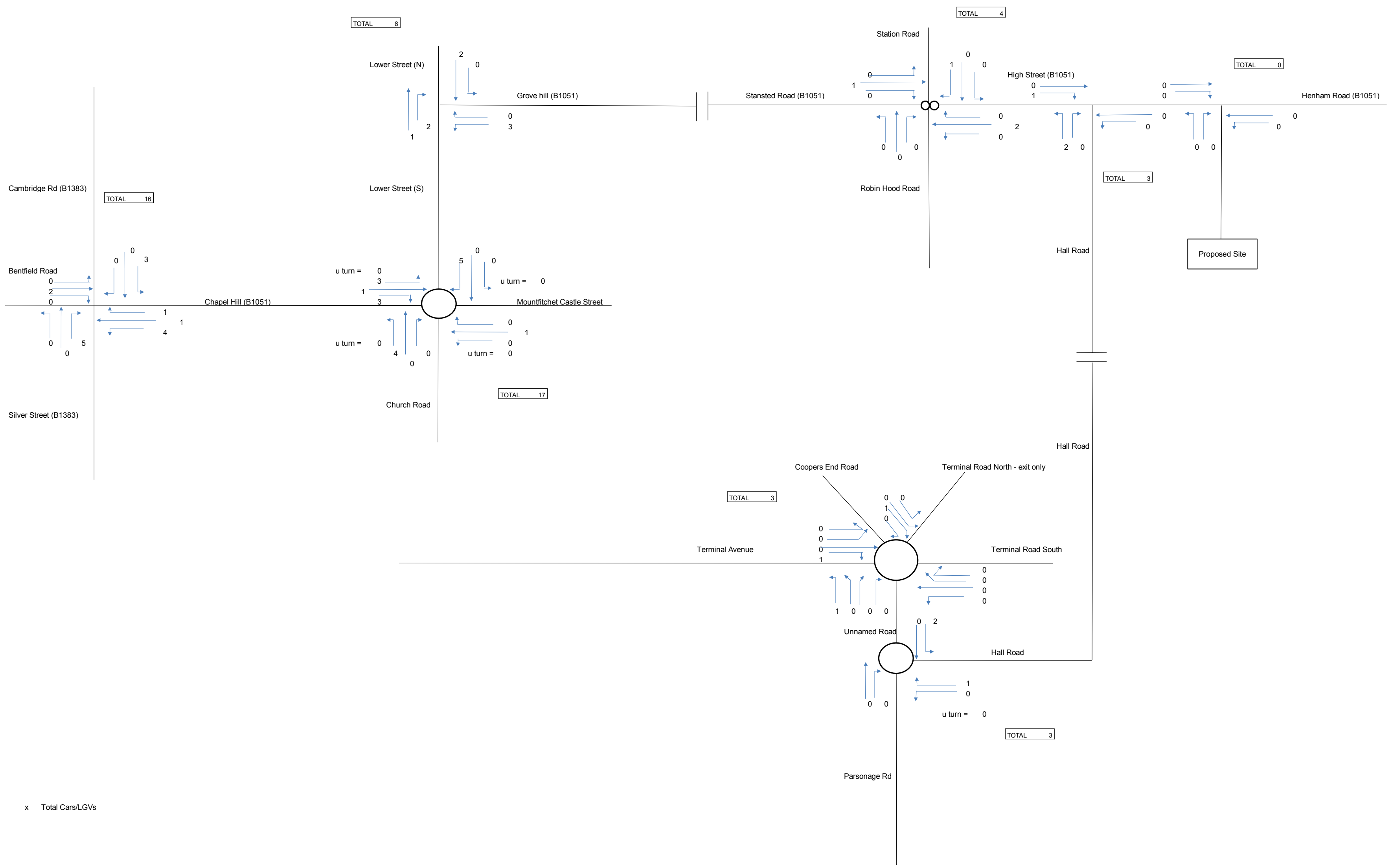
London EC3M 5JE

Client **Countryside**		Project **Land South of Henham Road, Elsenham**	
Date **July 2022**	Job No **2008170**		Drawing No
Committed Development Flows (Isabel Drive - 99 dwellings) - PM Peak			



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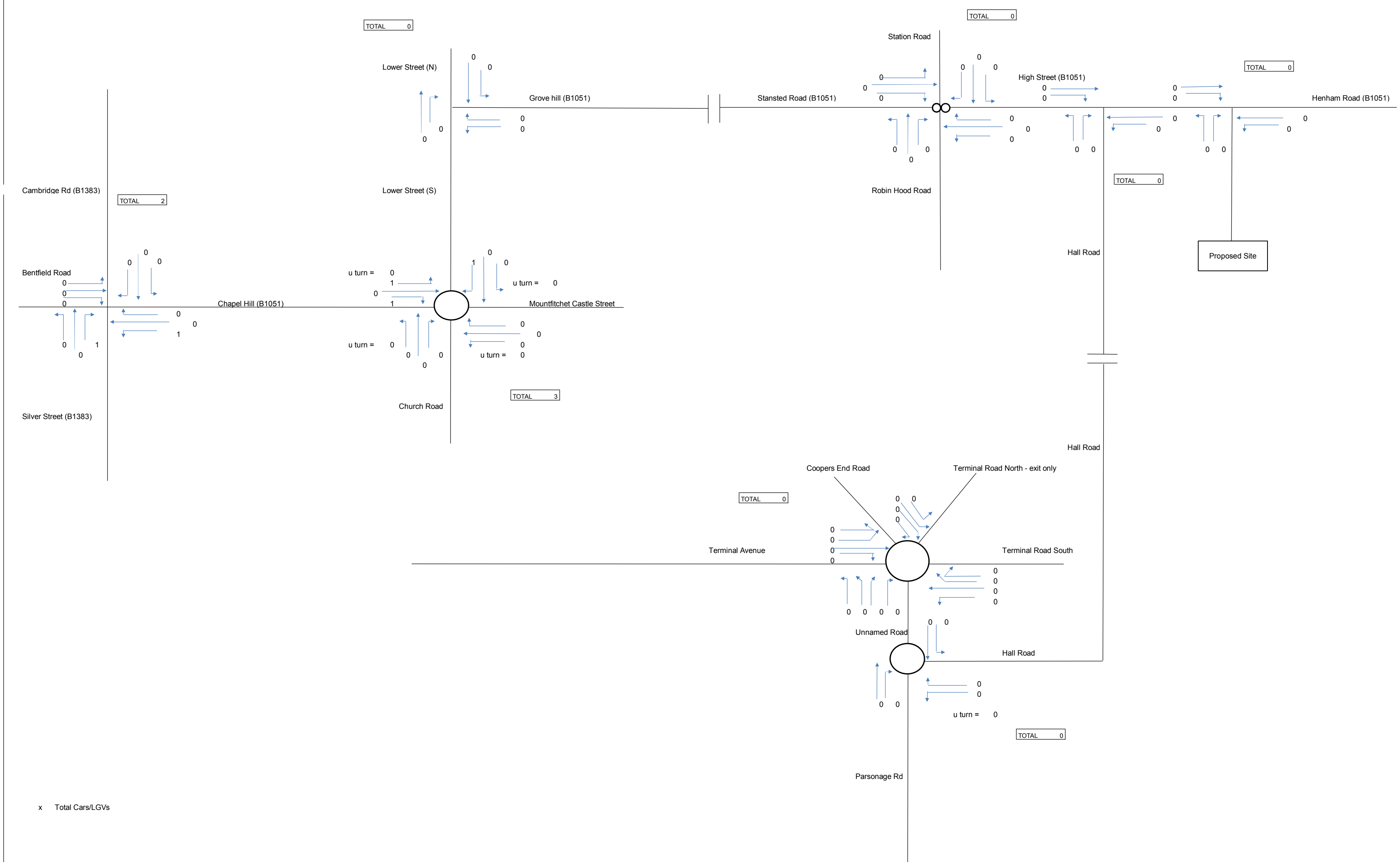
Client **Countryside**		Project **Land South of Henham Road, Elsenham**	
Date **July 2022**	Job No **2008170**		Drawing No
Committed Development Flows (Magna Carter School) - AM Peak			



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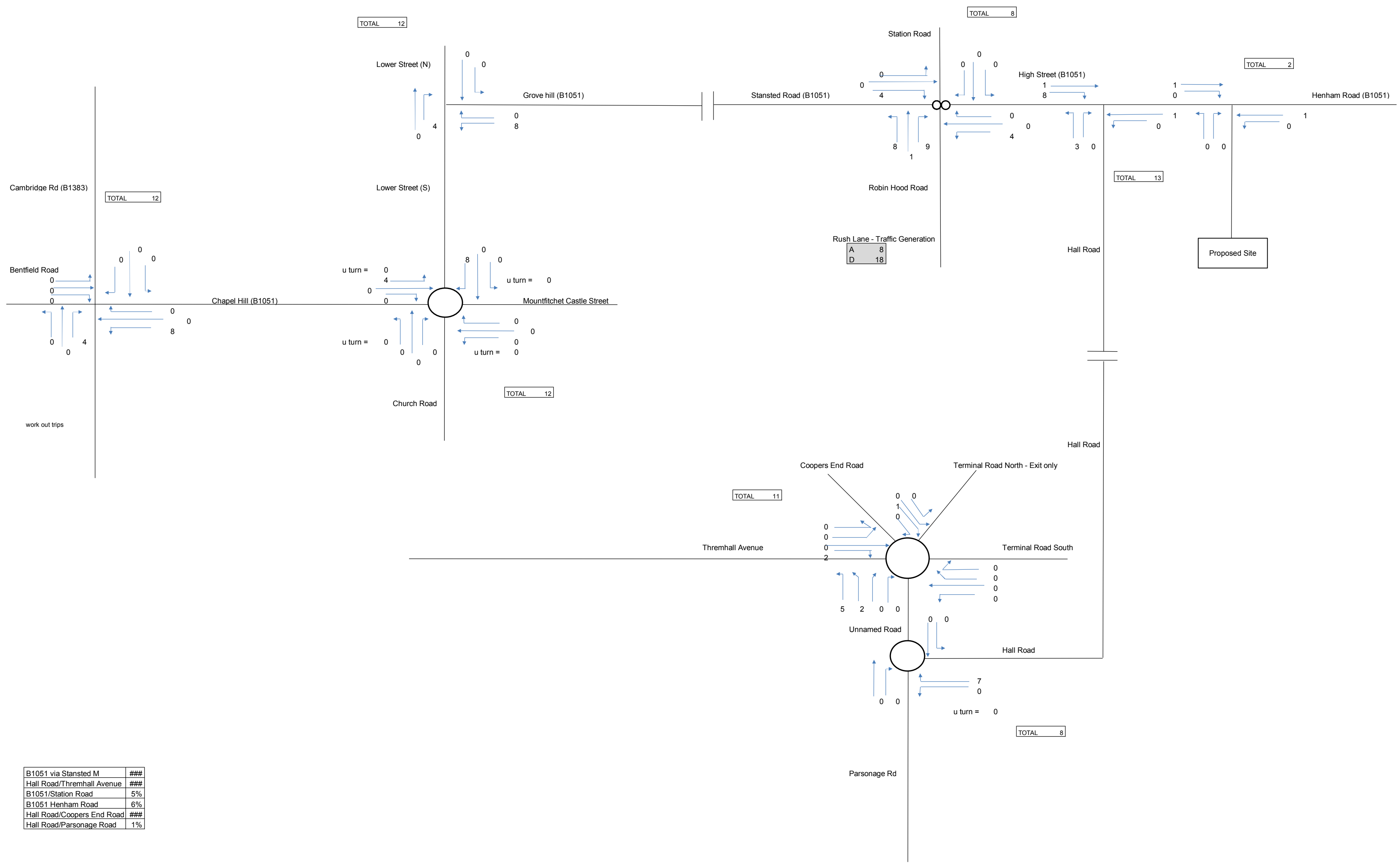
London EC3M 5JE

Client: **Countryside**		Project: **Land South of Henham Road, Elsenham**	
Date: **July 2022**	Job No: **2008170**		Drawing No
Committed Development Flows (Magna Carter School) - PM Peak			



B1051 via Stansted M	###
Hall Road/Thremhall Avenue	###
B1051/Station Road	5%
B1051 Henham Road	6%
Hall Road/Coopers End Road	###
Hall Road/Parsonage Road	1%

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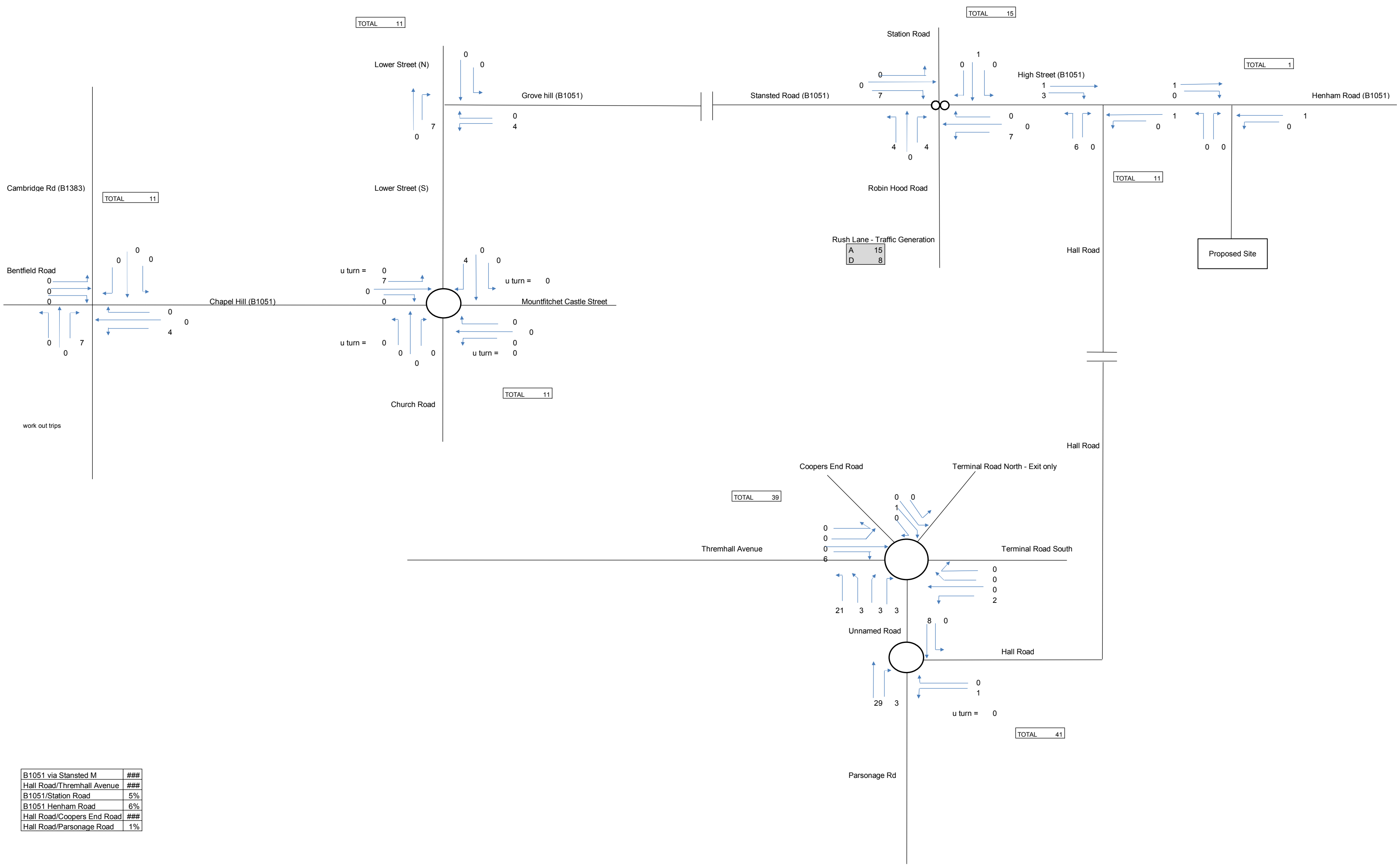
London EC3M 5JE

Client	Project
Countryside	**Land South of Henham Road, Elsenham**

Date	Job No	Drawing No
July 2022	**2008170**	

Committed Development Flows (Land at Rush Lane - 44 dwellings) - AM Peak



B1051 via Stansted M	###
Hall Road/Thremhall Avenue	###
B1051/Station Road	5%
B1051 Henham Road	6%
Hall Road/Coopers End Road	###
Hall Road/Parsonage Road	1%

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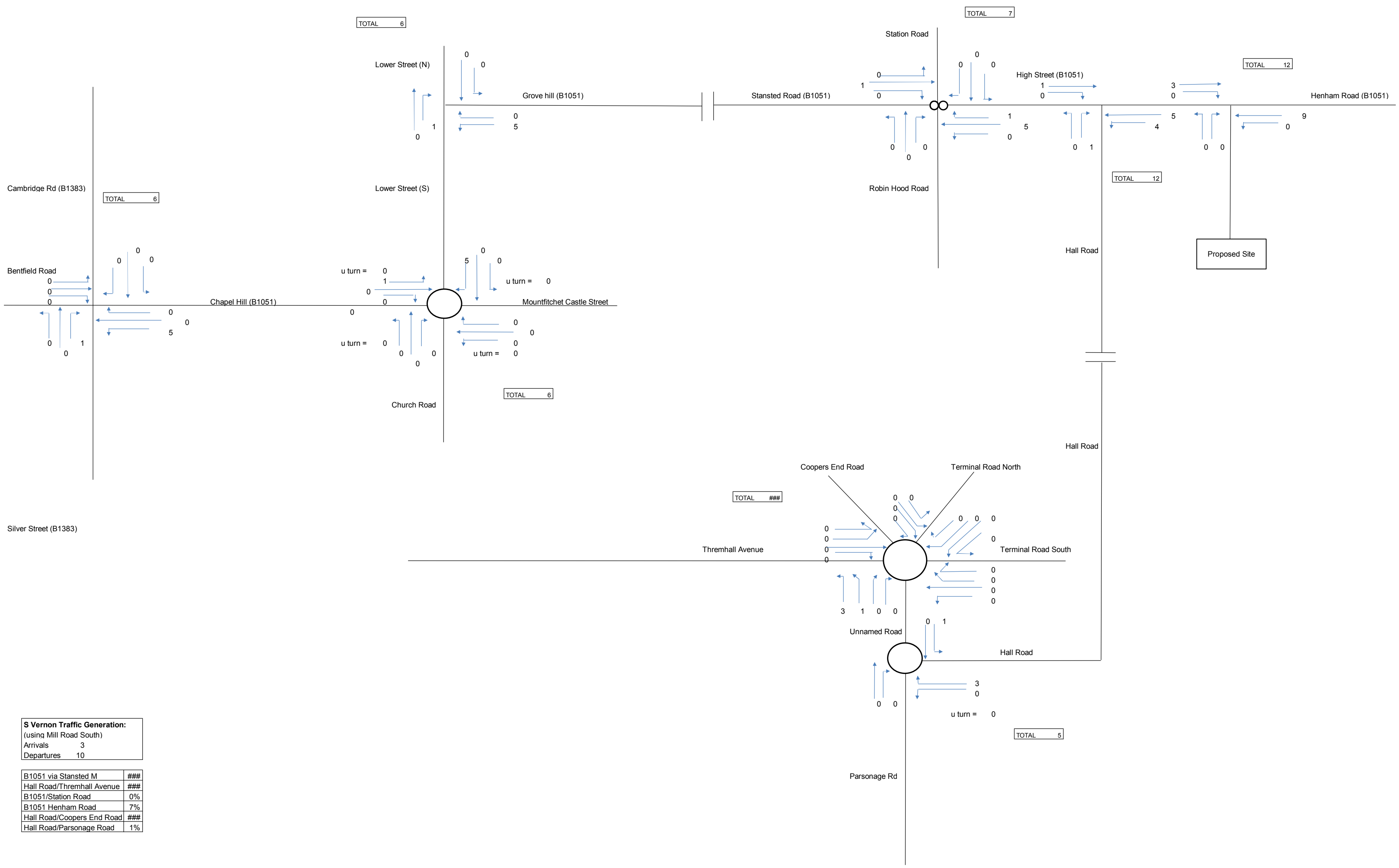
London EC3M 5JE

Client: **Countryside**		Project: **Land South of Henham Road, Elsenham**	
Date: **July 2022**	Job No: **2008170**		Drawing No
Committed Development Flows (Land at Rush Lane - 44 dwellings) - PM Peak			



S Vernon Traffic Generation:	
(using Mill Road South)	
Arrivals	3
Departures	10

B1051 via Stansted M	###
Hall Road/Thremhall Avenue	###
B1051/Station Road	0%
B1051 Henham Road	7%
Hall Road/Coopers End Road	###
Hall Road/Parsonage Road	1%

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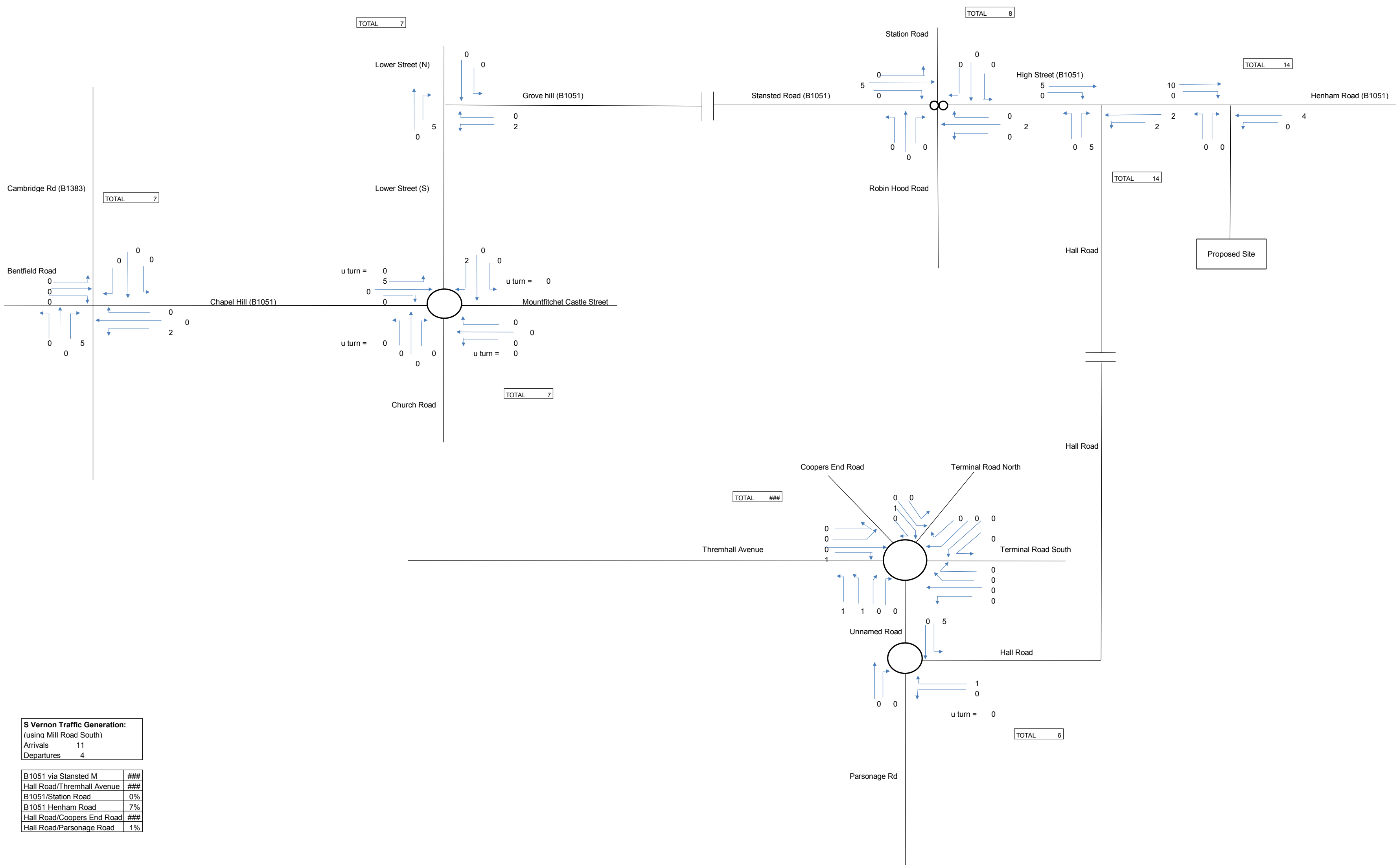
Client	Project
Countryside	Land South of Henham Road, Elsenham

Date	Job No	Drawing No
July 2022	2008170	

Committed Development Flows (Vernon Close - 45 dwellings) - AM Peak



S Vernon Traffic Generation:	
(using Mill Road South)	
Arrivals	11
Departures	4

B1051 via Stansted M	###
Hall Road/Thremhall Avenue	###
B1051/Station Road	0%
B1051 Henham Road	7%
Hall Road/Coopers End Road	###
Hall Road/Parsonage Road	1%

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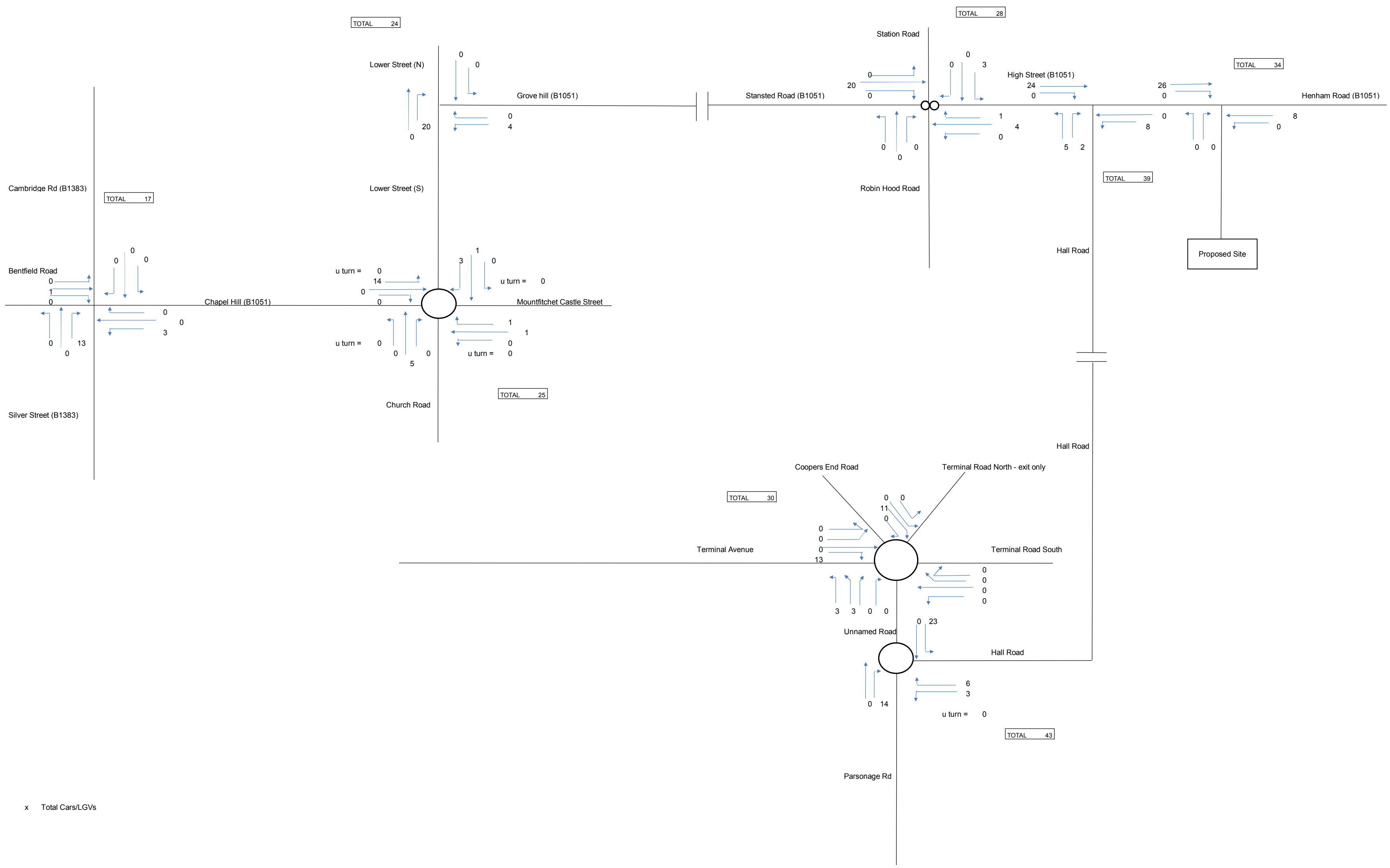
Client	Project
Countryside	**Land South of Henham Road, Elsenham**

Date	Job No	Drawing No
July 2022	**2008170**	

Committed Development Flows (Vernon Close - 45 dwellings) - PM Peak



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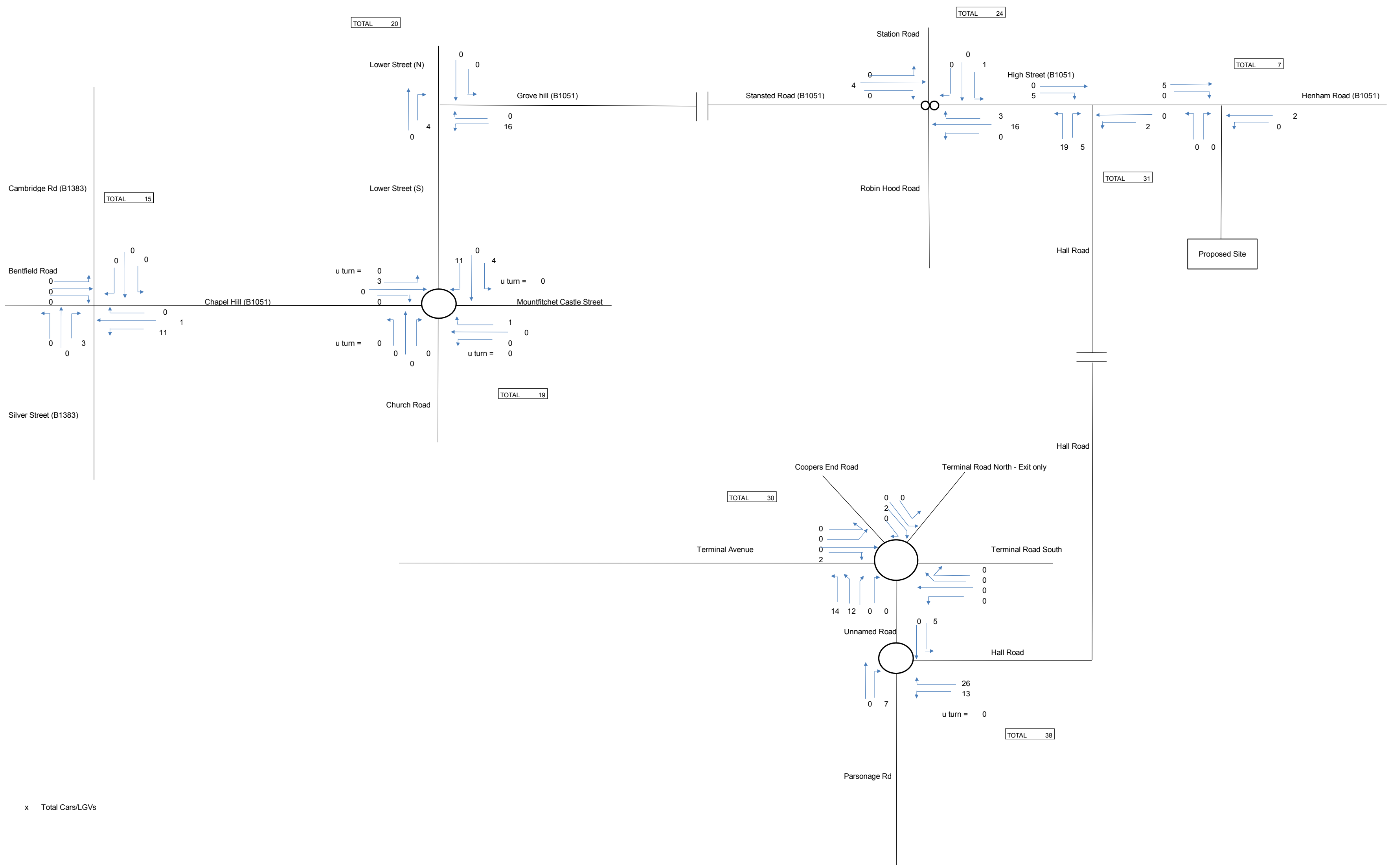
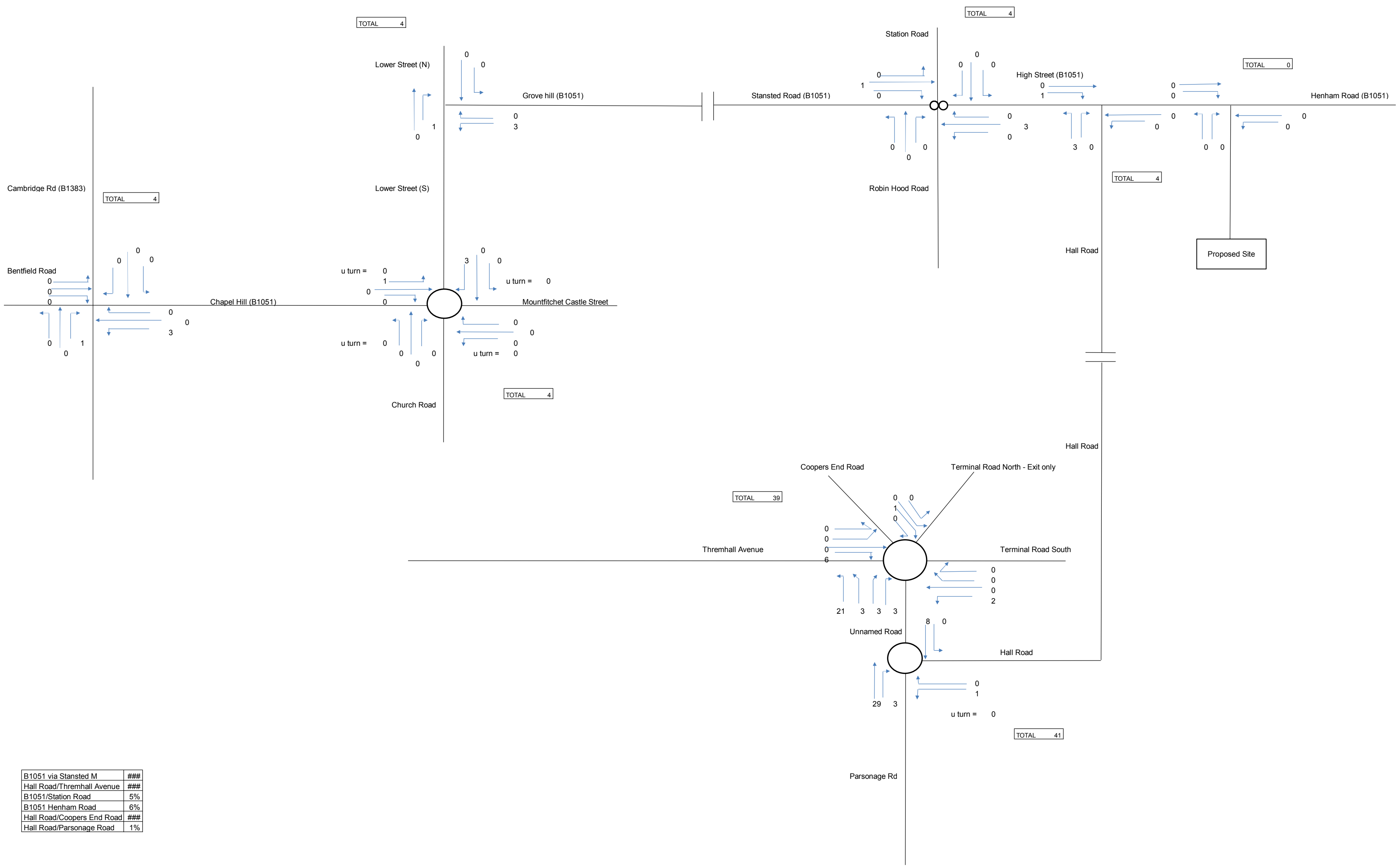
Client: **Countryside**	Project: **Land South of Henham Road, Elsenham**
Date: **July 2022** / Job No: **2008170**	Drawing No
Committed Development Flows (Trisail) - AM Peak	



ARDENT CONSULTING ENGINEERS Third Floor, The Hallmark Building 52-56 Leadenhall Street London EC3M 5JE	Client **Countryside**	Project **Land South of Henham Road, Elsenham**
	Date: **July 2022** / Job No: **2008170**	Drawing No
	Committed Development Flows (as used in E Elsenham) - PM Peak	



B1051 via Stansted M	###
Hall Road/Thremhall Avenue	###
B1051/Station Road	5%
B1051 Henham Road	6%
Hall Road/Coopers End Road	###
Hall Road/Parsonage Road	1%

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Client
Countryside

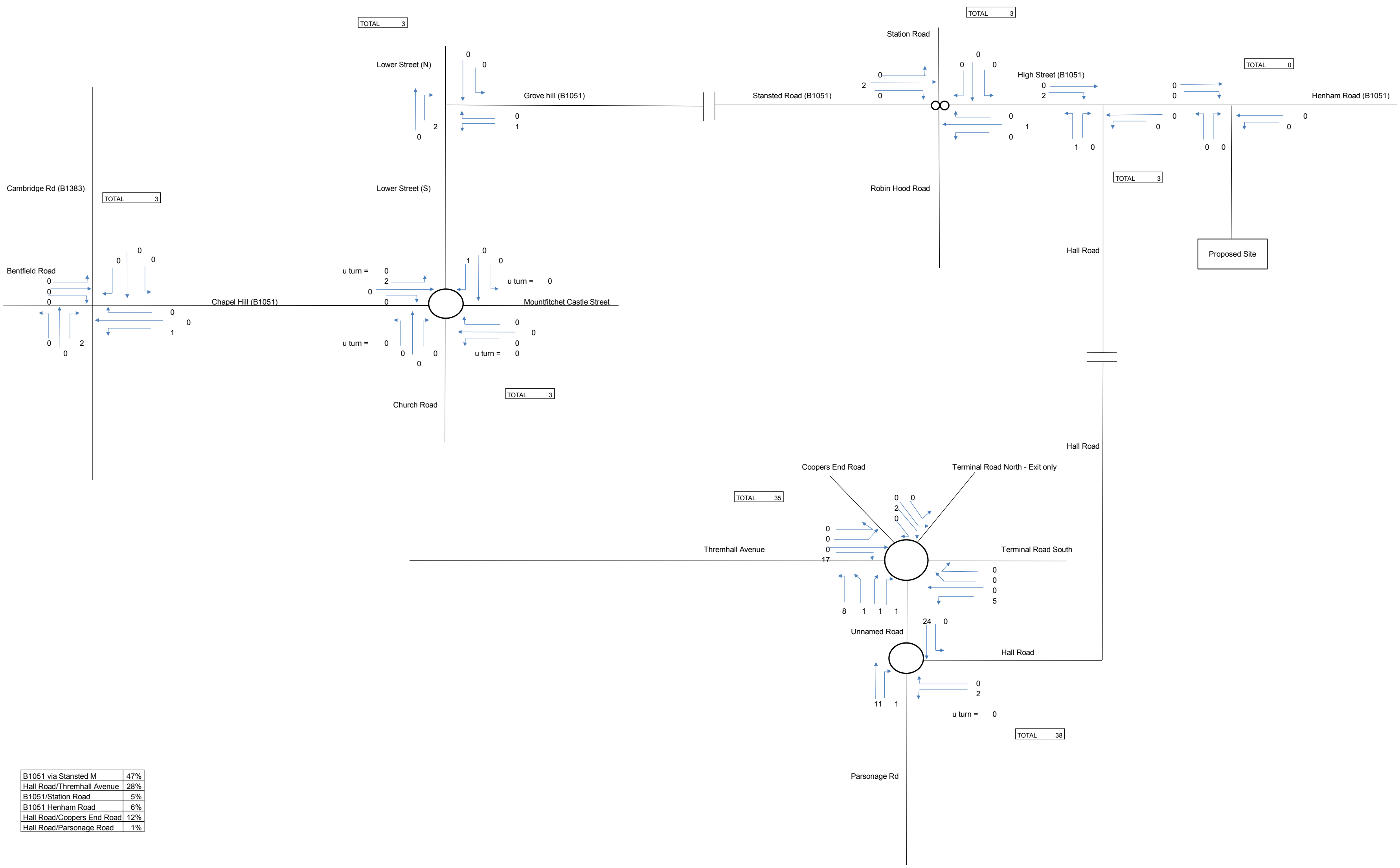
Project
Land South of Henham Road, Elsenham

Date
July 2022

Job No
2008170

Drawing No

Committed Development Flows (W of Parsonage Road - 119 dwellings) - AM Peak



B1051 via Stansted M	47%
Hall Road/Thremhall Avenue	28%
B1051/Station Road	5%
B1051 Henham Road	6%
Hall Road/Coopers End Road	12%
Hall Road/Parsonage Road	1%

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London EC3M 5JE

Client: **Countryside**

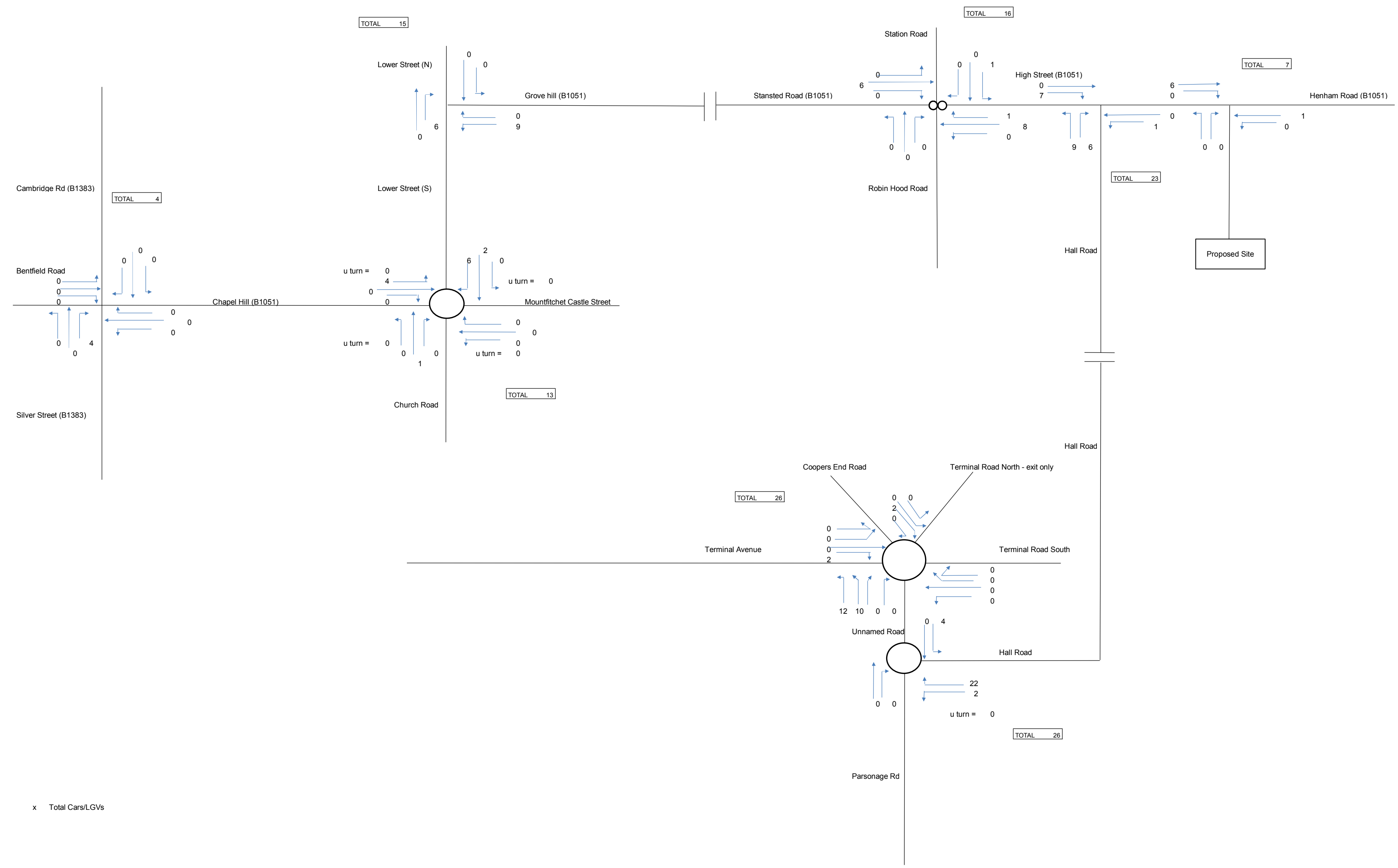
Project: **Land South of Henham Road, Elsenham**

Date: **July 2022**

Job No: **2008170**

Drawing No

Committed Development Flows (W of Parsonage Road - 119 dwellings) - PM Peak



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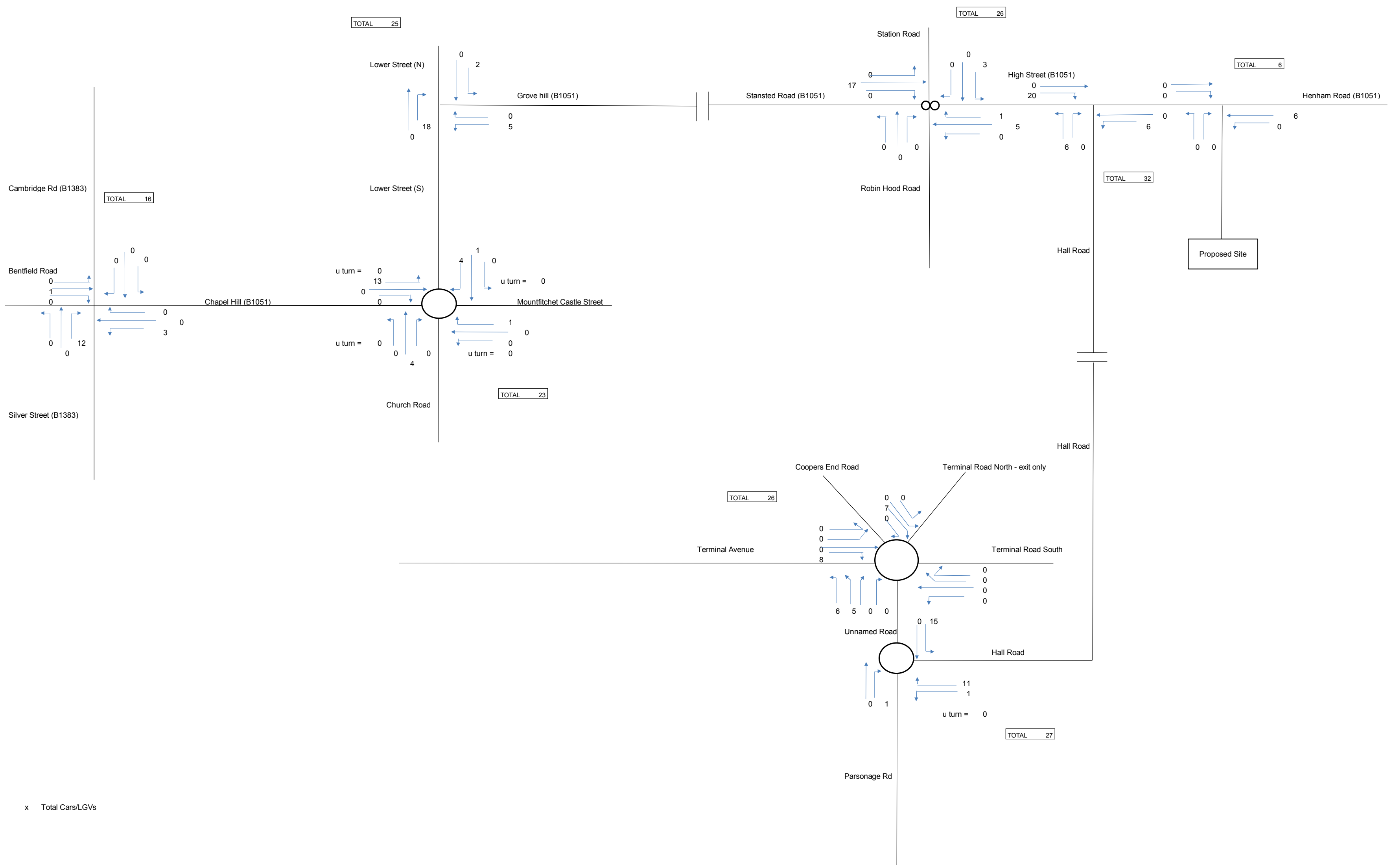
London EC3M 5JE

Client: **Countryside**		Project: **Land South of Henham Road, Elsenham**	
Date: **July 2022**	Job No: **2008170**		Drawing No
	Committed Development Flows (West Hall Road) - AM Peak		



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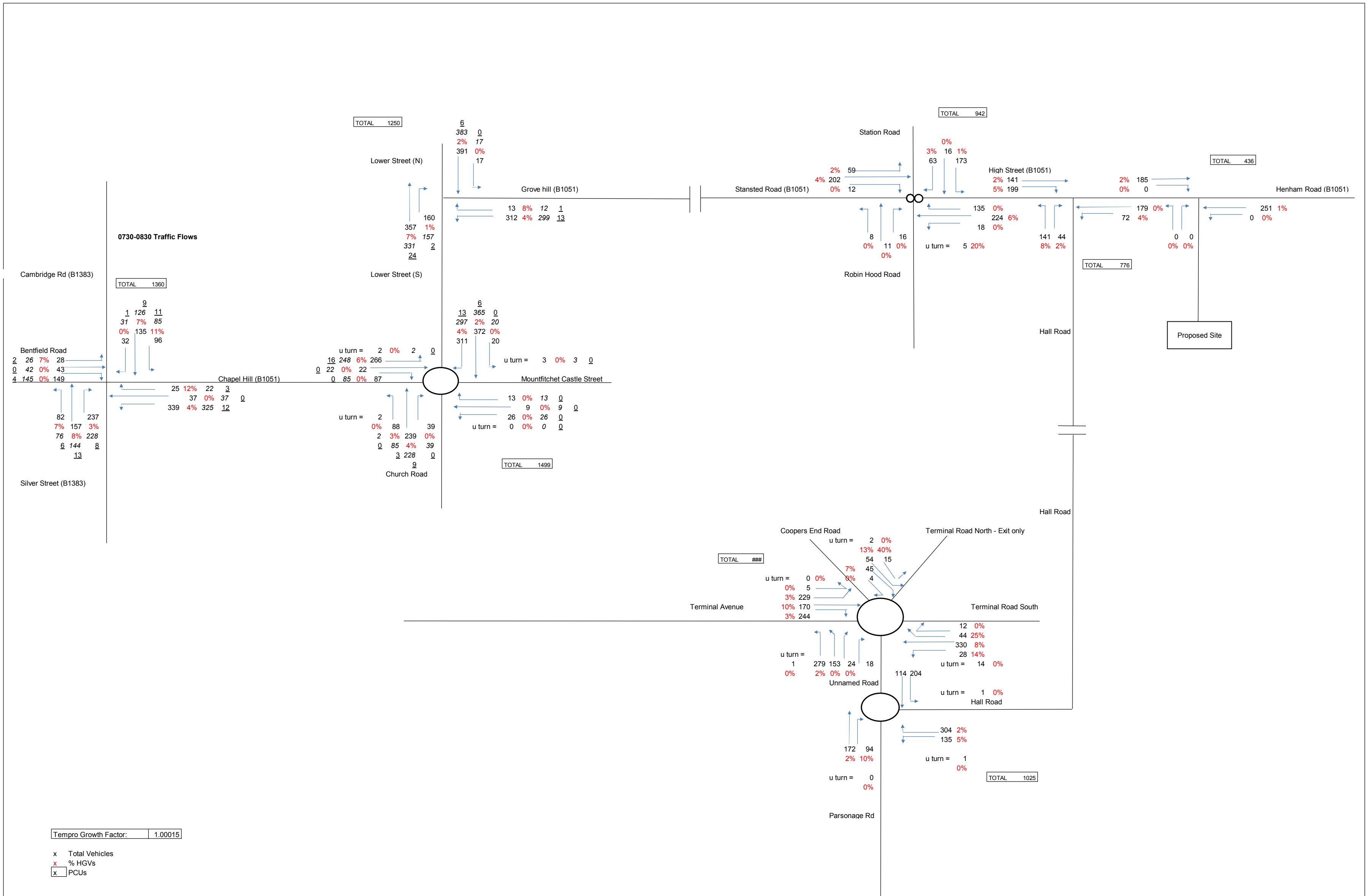
	Date **July 2022** / Job No **2008170**	Drawing No
	Committed Development Flows (West Hall Road) - PM Peak	

Appendix E



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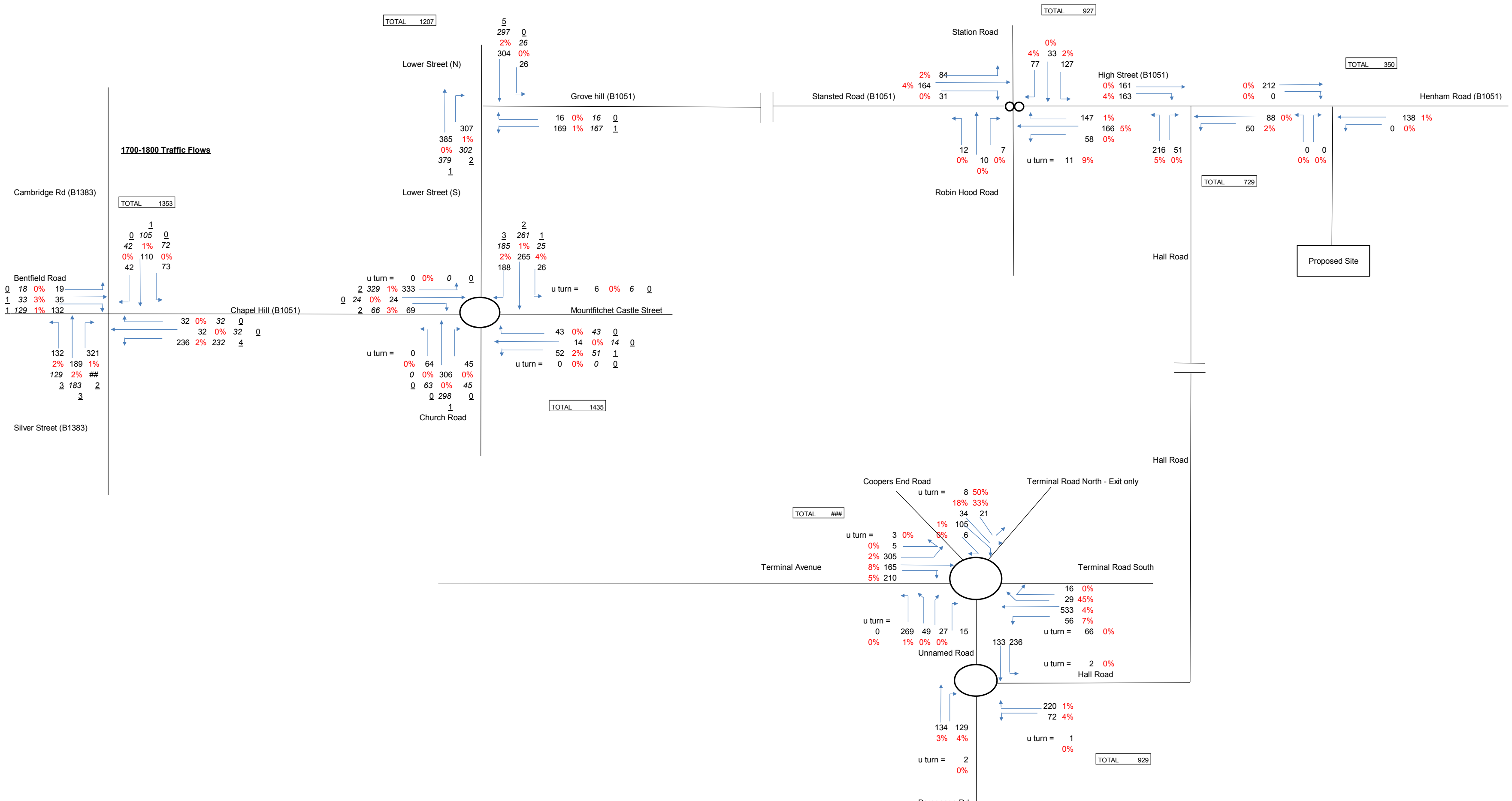
Client: **Countryside**		Project: **Land South of Henham Road, Elsenham**
Date: **July 2022**	Job No: **2008170**	Drawing No
2027 Background Flows (using 2022 survey flows + Tempro Growth) - AM Peak		



Tempro Growth Factor:	0.99975

x Total Vehicles
x % HGVs
x PCUs

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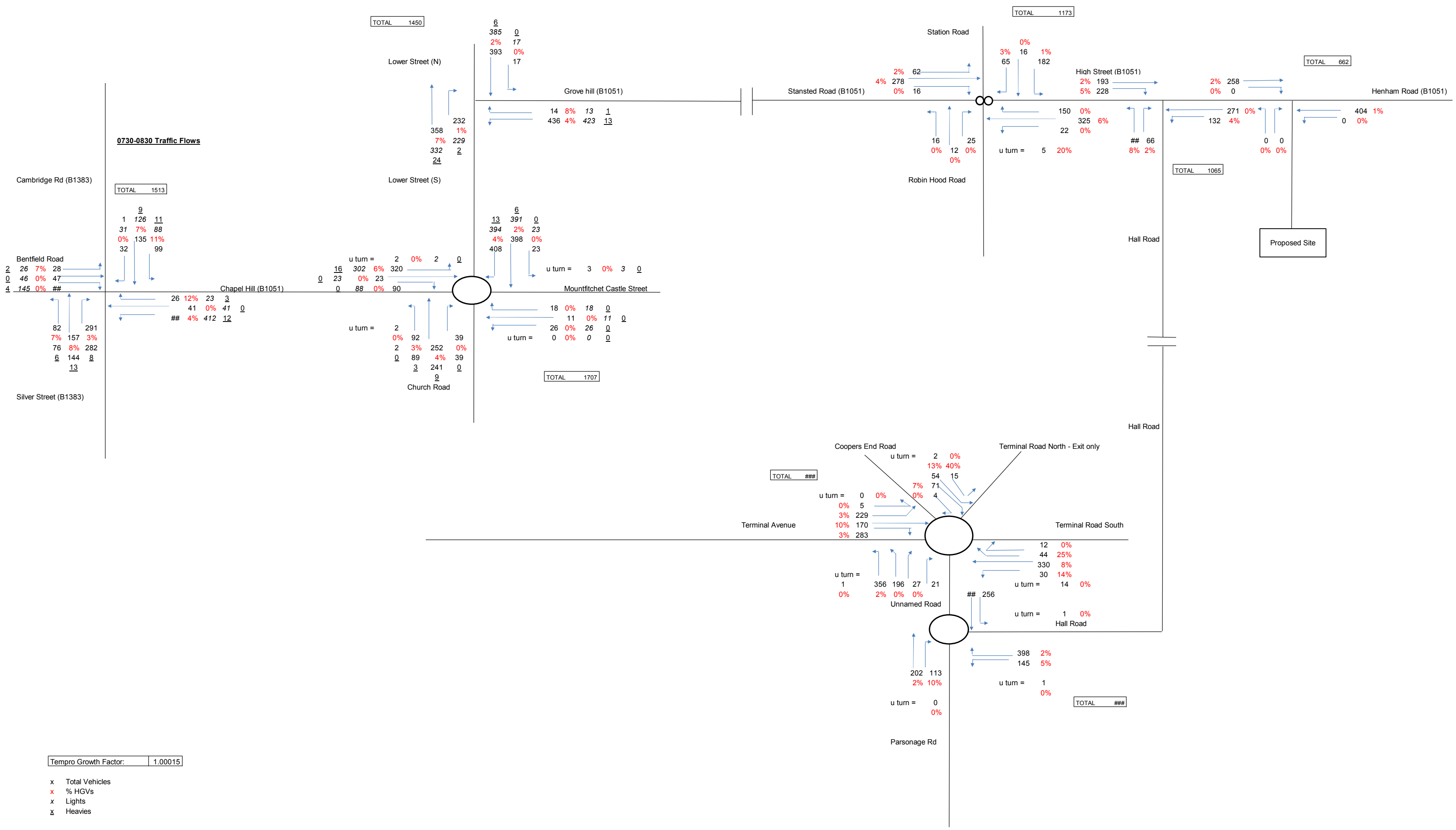
Client	Project
Countryside	**Land South of Henham Road, Elsenham**

Date	Job No	Drawing No
July 2022	**2008170**	

2027 Background Flows (using 2022 survey flows + Tempro Growth) - PM Peak



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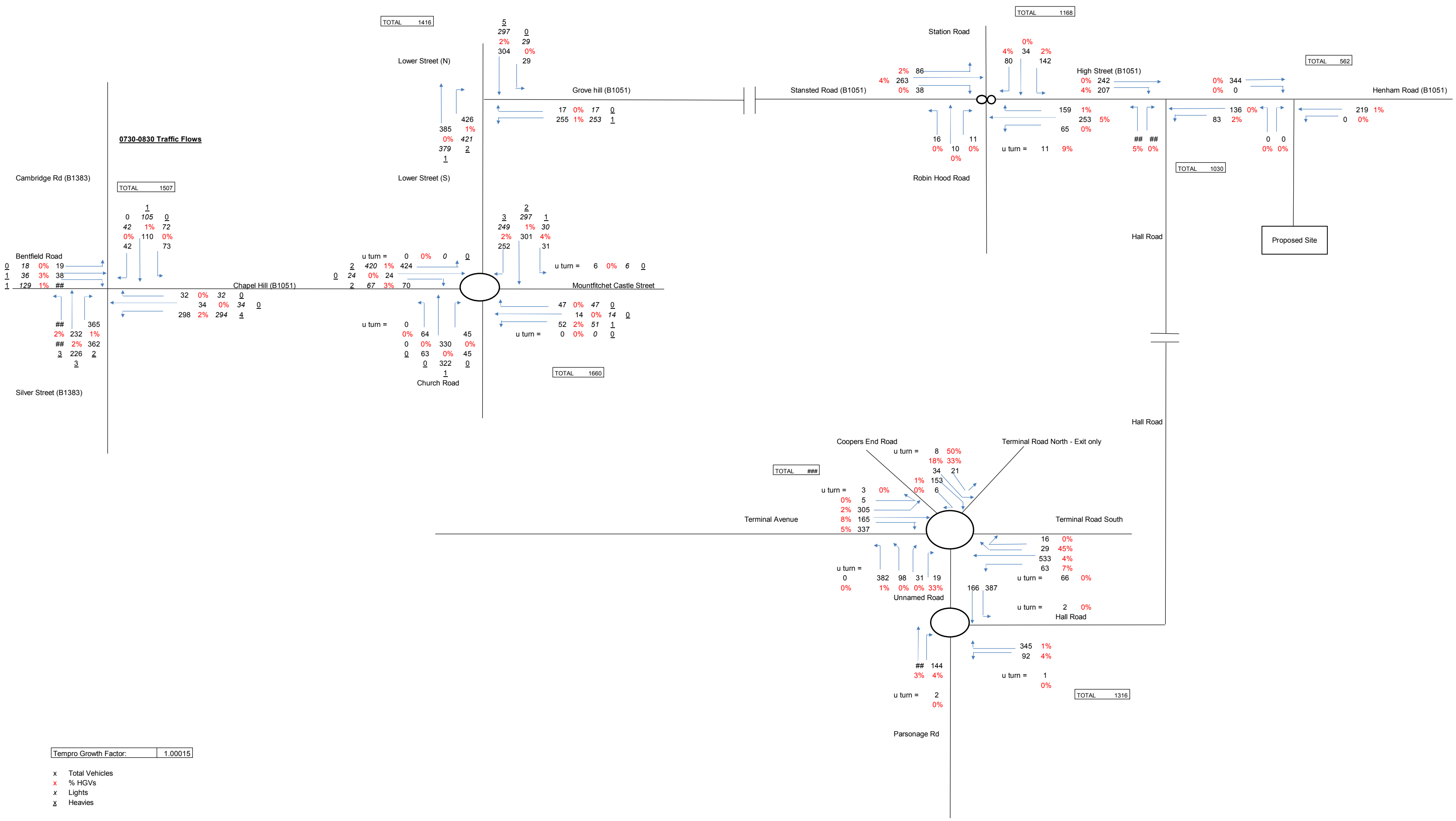
London EC3M 5JE

Client	Project
Countryside	**Land South of Henham Road, Elsenham**

Date	Job No	Drawing No
July 2022	**2008170**	

2027 Base Flows (using 2022 survey flows + Tempro + Committed Dev) - AM Peak



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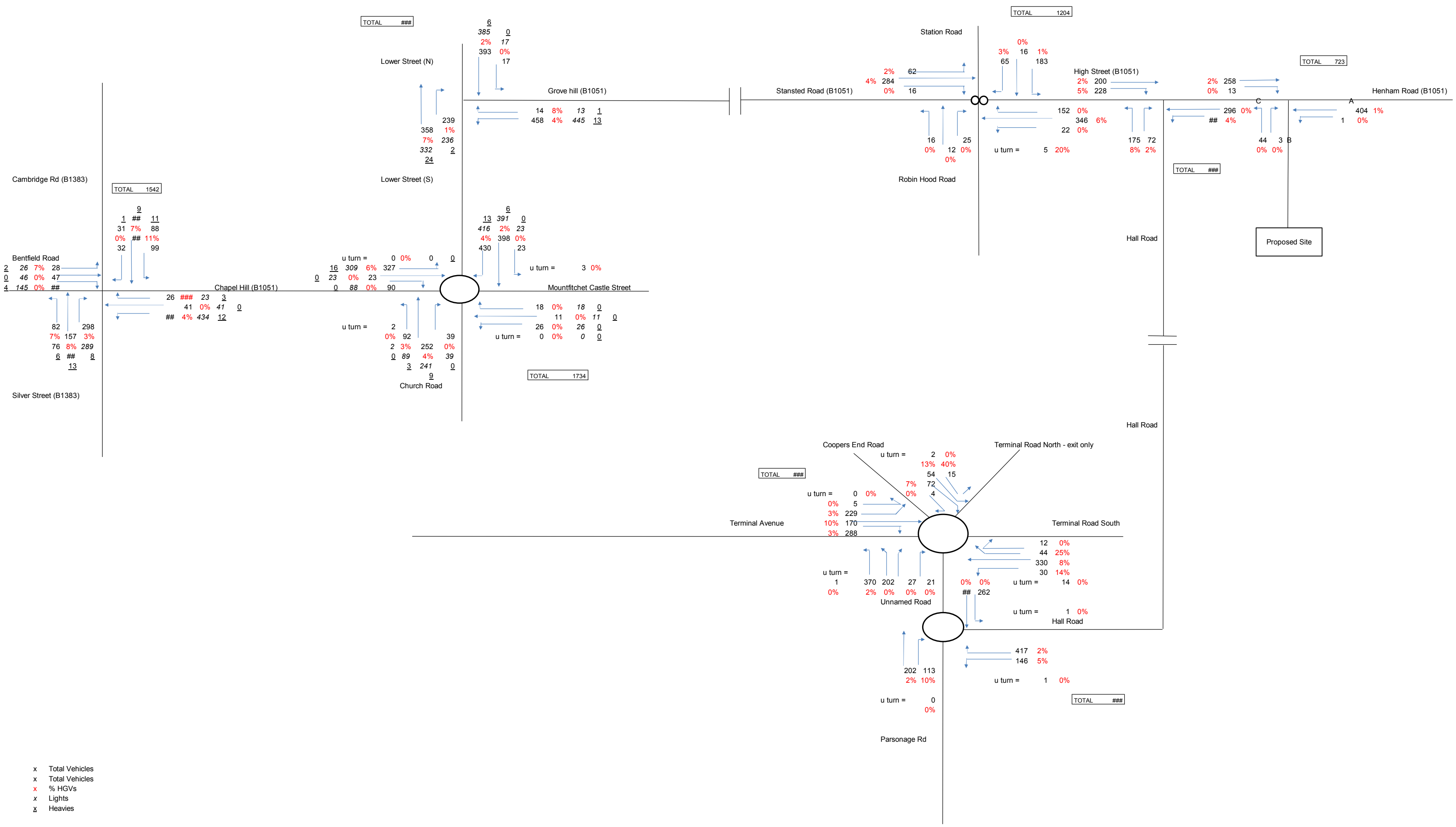
London EC3M 5JE

Client **Countryside**		Project **Land South of Henham Road, Elsenham**	
Date **July 2022**	Job No **2008170**		Drawing No
2027 Base Flows (using 2022 survey flows + Tempro Growth + Committed Dev) - PM Peak			

Appendix F



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Third Floor, The Hallmark Building
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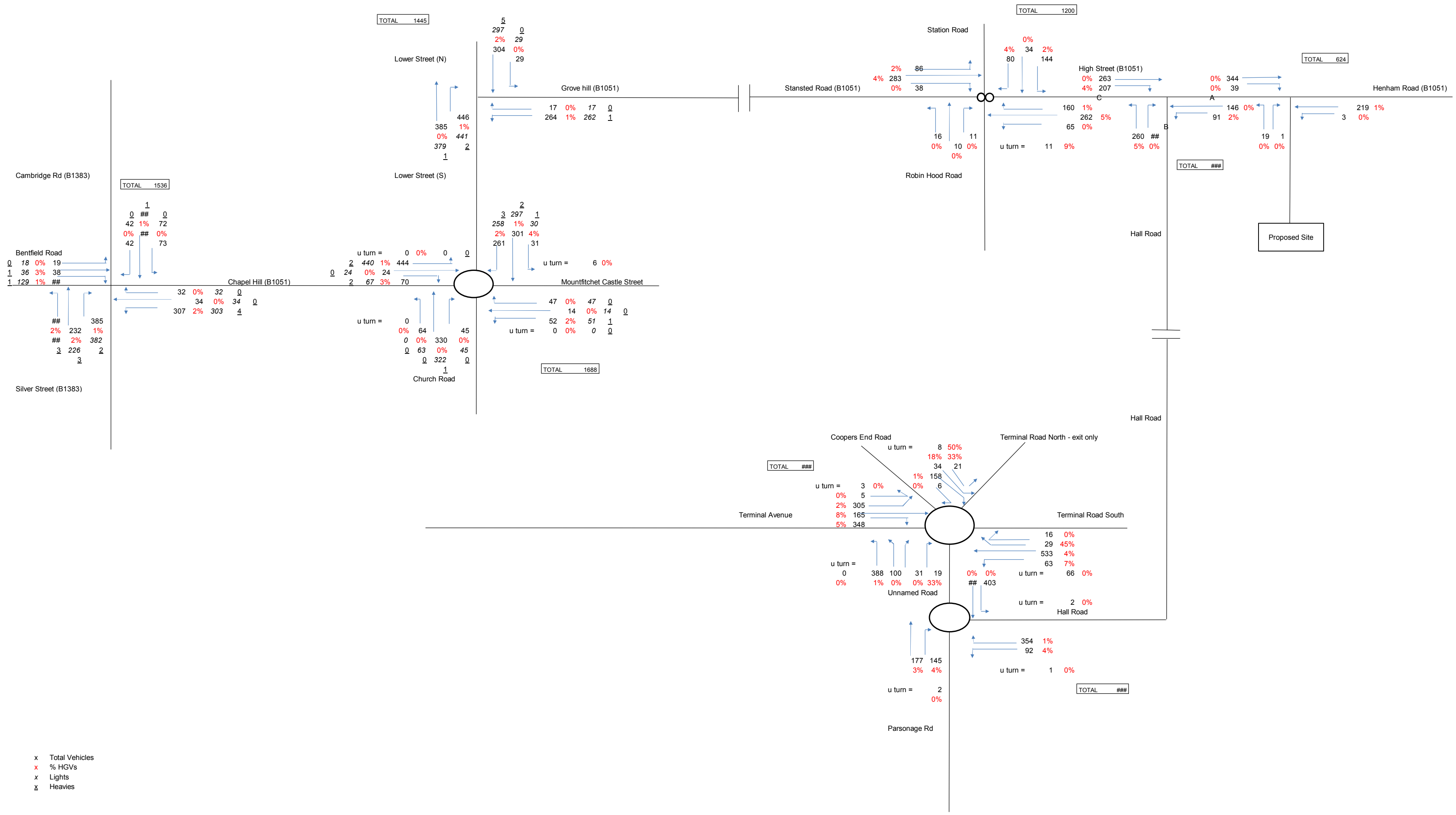
London EC3M 5JE

Client		Project	
Countryside		**Land South of Henham Road, Elsenham**	
Date	Job No		Drawing No
July 2022	**2008170**		

2027 Base (using 2022 survey flows + Tempro Growth committed dev) + Development Flows - AM Peak



ARDENT CONSULTING ENGINEERS

Third Floor, The Hallmark Building
52-56 Leadenhall Street
London EC3M 5JE

Client	Project
Countryside	**Land South of Henham Road, Elsenham**

Date	Job No	Drawing No
July 2022	**2008170**	

2027 Base (using 2022 survey flows + committed dev) + Development Flows - PM Peak

APPENDIX C:

LAND EAST OF ELSENHAM

TRANSPORT ASSESSMENT: ADDENDUM,

PRODUCED BY WSP

Fairfield (Elsenham) Ltd

LAND EAST OF ELSENHAM

Transport Assessment: Addendum

FEBRUARY 2019

PUBLIC

Fairfield (Elsenham) Ltd

LAND EAST OF ELSENHAM

Transport Assessment: Addendum

TYPE OF DOCUMENT (VERSION) PUBLIC

PROJECT NO. 11500582

DATE: FEBRUARY 2019

WSP

62-64 Hills Road
Cambridge
CB2 1LA

Phone: +44 1223 558 050

Fax: +44 1223 558 051

[redacted]

QUALITY CONTROL

Issue/revision	First issue	Revision 1	Revision 2	Revision 3
Remarks	For Issue			
Date	Feb 2019			
Prepared by	G Corrance			
Signature				
Checked by				
Signature				
Authorised by				
Signature				
Project number	11500582			
Report number				
File reference				

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APPENDIX B

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APPENDIX D

MODELLING UPDATE PAPER

APPENDIX E

NOTES OF MEETING WITH ECC 26TH NOV 2018

APPENDIX F

MICROSIMULATION MODELLING TECHNICAL NOTE 03 REV C

APPENDIX G

ACCESS JUNCTION RSA

APPENDIX H

ACCIDENTS ON HALL ROAD BRIEFING PAPER

1 INTRODUCTION

1.1 INTRODUCTION

1.1.1. An outline planning application for up to 350 dwellings and a primary school, to be sited on land east of Elsenham, was submitted to Uttlesford District Council in December 2017. The planning application (ref: UTT/17/3573/OP) was supported by a Transport Assessment report.

1.1.2. The Transport Assessment report concludes;

The assessment provided in this TA shows that the proposed development generated trips will not have a severe impact on the operation of the existing local pedestrian, cycle, public transport and road networks. Transport improvements including new bus stops, a walk and cycle connection to Elsenham Station and a Henham Road pedestrian improvement scheme will provide benefits to existing and future residents accessing the village centre. A RTP will also be implemented that will include measures to encourage sustainable travel to and from the proposed development.

1.1.3. Post-planning application discussions have been held with both Highways England and Essex County Council. Highways England is highway authority for the strategic road network and Essex County Council is the highway authority for the local road network. Post-application discussions with both highway authorities are described below.

1.2 HIGHWAYS ENGLAND

1.2.1. Highways England's consultants AECOM produced their Technical Note 02, which describes their comments relating to the Elsenham planning application. Technical Note 02 is enclosed at Appendix A. The technical note was provided to WSP by Highways England on the 12th March 2018.

1.2.2. A meeting between Highways England, AECOM and WSP was held on the 2nd May 2018 at HE's Bedford offices. It was agreed at that meeting that HE was satisfied with all transport aspects relating to the Elsenham application with the exception of the impact of development on the Bassingbourn Roundabout (which forms part of Stansted Airport's access road system). It was agreed that WSP would assess the Bassingbourn Roundabout junction.

1.2.3. WSP's Technical Note 04, dated 1st August 2018, describes the assessment of the Bassingbourn Roundabout. It concludes that the Elsenham development would have a minimal impact on the operation of the roundabout.

1.2.4. WSP's technical note was sent to HE and AECOM on the 8th August 2018. It is understood that HE has not yet appraised the technical note and that HE is continuing to maintain a holding position with regards to the Elsenham application.

1.2.5. A copy of Technical Note 04 is enclosed at Appendix B.

1.3 ESSEX COUNTY COUNCIL

1.3.1. WSP first met with County Council highways officers on the 27th March 2018 to discuss highways matters arising from the Elsenham planning application.

1.3.2. ECC outlined their concerns relating to the transport assessment undertaken for the planning application. The County Council's principal concern relates to the traffic survey undertaken in 2017 and the extent to which the VISSIM modelling undertaken for Stansted Mountfitchet could be relied upon.

1.3.3. The County Council stated that it had doubt as to whether the traffic surveys undertaken in 2017 (to inform the Transport Assessment report) had adequately captured traffic conditions at the Grove Hill traffic signals at Stansted Mountfitchet.

1.3.4. In addition, ECC requested a Stage 1 road safety audit for the proposed development site's access junction. They also requested that the consideration of the accident history of Hall Road should be extended to bring it up to the present date: this was to establish whether a recent fatal accident at Hall Road had implications for the proposed Elsenham development.

1.3.5. Following discussions with ECC officers, it was agreed that WSP would resurvey the highway network at Stansted Mountfitchet, particularly the section of Grove Hill which is subject to traffic signal control. It was also agreed that the traffic modelling for Stansted Mountfitchet would be updated to take account of the resurvey results.

1.3.6. The further traffic survey at Stansted Mountfitchet and the updated VISSIM traffic modelling is considered in the following section of this report.

1.4 REPORT STRUCTURE

1.4.1. This Transport Assessment Addendum report is structured as follows;

I. Section 2 describes the process of refreshing the 2017 traffic surveys: it also describes the remodelling of Stansted Mountfitchet and the identification of the measures required to mitigate the impact of development;

II. Section 3 describes the site access junction safety audit. It also provides an updated assessment of the safety record of Hall Road; and

III. Section 4 offers a summary and conclusions.

2 UPDATED MODELLING FOR STANSTED MOUNTFITCHET

2.1 INTRODUCTION

2.1.1. As described above, WSP met with officers of Essex County Council on the 27th March 2018 to review the Transport Assessment report submitted as part of the Elsenham planning application.

2.1.2. Officers expressed their concerns that the 2017 traffic survey hadn't fully captured traffic behaviour at the Stansted Mountfitchet Grove Hill traffic signals.

2.1.3. WSP agreed to resurvey the highway network local to the traffic signals. A specification for the traffic survey was agreed with ECC – the survey specification is enclosed at Appendix C.

2.1.4. The further traffic survey was conducted over the two-weeks period between 25th June 2018 and 8th July 2018.

2.1.5. A comparison between the results of the 2017 survey results (as used for the Transport Assessment report) and the 2018 survey results revealed that traffic levels in Stansted Mountfitchet were consistent between the two surveys.

2.1.6. The results of the 2018 survey confirmed that the County Council's concerns regarding the accuracy of the 2017 survey results at Grove Hill were correct. It is apparent that the 2017 survey did not capture the full extent of southbound queuing (ie traffic travelling to Stansted Mountfitchet from the direction of Elsenham) at the northern end of the signalised section of Grove Hill.

2.1.7. By way of an explanation, there is a short length of on-street parking (associated with nearby dwellings) located immediately to the north of the signal controlled section of Grove Hill. Traffic arriving from the direction of Elsenham queues over a short distance from the signals stop line (ie with signals showing red), but leaves a gap at the on-street parking so that the road isn't blocked. The traffic queue reforms as a secondary queue on the northern side of the on-street parking. The 2017 survey captured queuing at the signals stop line only – it did not capture the secondary queue of traffic waiting on the northern side of the on-street parking.

2.1.8. This situation has been rectified through the use of the 2018 survey results. The Stansted Mountfitchet traffic model has been recalibrated to ensure that both the primary and secondary southbound queues (ie traffic arriving from the direction of Elsenham) are incorporated into the model. The VISSIM model now fully replicates the behaviour of traffic in Stansted Mountfitchet.

2.1.9. An extended dialogue has been held between WSP's modelling team and ECC's traffic signals engineers, in order to identify and agree the operating characteristics of the Grove Hill signals. A number of vagaries have been observed from video recordings of the traffic signals in operation (undertaken as part of the 2018 survey). Considerable effort has been taken to identify the vagaries, agree with them with ECC signals engineers and to then incorporate them into the VISSIM model. As a result, it is considered that the VISSIM model fully captures the operating characteristics of the Grove Hill signals.

2.2 INITIAL MODELLING

2.2.1. The initial results of the further modelling of Stansted Mountfitchet are described in WSP's modelling update paper (dated 22nd November 2018) which is enclosed at Appendix D. This paper identified measures at the Grove Hill signals which would mitigate the impact of the proposed Elsenham development.

2.2.2. The modelling update identifies that committed development schemes in the Elsenham/ Stansted Mountfitchet area would have a significant effect on the operation of the Grove Hill traffic signals. Traffic queues and delay at the signals would increase by a sizeable amount due to schemes which have been granted consent but have yet to come forward. There are no measures proposed to mitigate the effect of that development.

2.2.3. The modelling update paper identifies that the Elsenham development could mitigate the effect of both the proposed development and committed schemes through implementation of improvements to the Grove Hill signals. Reconfiguring vehicle detector arrangements at the northern set of traffic signals would improve the passage of traffic arriving from the direction of Elsenham through the signals, reducing the level of southbound traffic queuing and delay as a result. The mitigation offered by the Elsenham development would provide significant benefit to all users of the road network in Stansted Mountfitchet.

2.3 TRAFFIC SIGNALS IMPROVEMENTS

2.3.1. The updated traffic modelling and traffic signals improvements were discussed with Essex County Council at a meeting held on the 26th November 2018. Notes from that meeting are enclosed at Appendix E.

2.3.2. ECC indicated that they are intending to improve the Grove Hill traffic signals circa Spring 2019. Those improvements comprise replacement of ageing traffic signals equipment: the improvements will not improve the capacity of the signals *per se*.

2.3.3. It has been agreed that the reconfigured vehicle detector arrangements proposed by WSP would be compatible with the County Council's scheme. It has also been established that the detector improvements could be implemented after completion of the County Council's scheme through a s278 arrangement between the developer and the County Council.

2.4 VISSIM MODELLING TECHNICAL NOTE

2.4.1. WSP's Technical Note 03 Rev C (dated 23rd January 2019) fully describes the traffic modelling undertaken at Stansted Mountfitchet (ie incorporating the 2018 traffic survey results). This technical note is enclosed at Appendix F.

2.4.2. WSP's Technical Note 03 Rev C confirms that improving the northern set of signals' vehicle detection arrangements would mitigate the impact of the proposed Elsenham development.

2.4.3. WSP's Technical Note 03 Rev C, together with a copy of the Stansted Mountfitchet VISSIM traffic model, were issued to Essex County Council on the 24th January 2019.

3 ACCESS JUNCTION SAFETY AUDIT AND ACCIDENTS ON HALL ROAD

3.1 INTRODUCTION

3.1.1. Essex County Council has requested a Stage 1 road safety audit (RSA) for the proposed development site's access junction. They have also asked for further consideration of accidents on Hall Road. These items are described in turn below.

3.2 SITE ACCESS JUNCTION RSA

3.2.1. The Transport Assessment report describes the proposed site access junction: it is illustrated by drawing 0582-GA-002E which is enclosed at Appendix B within the TA report.

3.2.2. The site access junction has been safety audited by independent auditors Ltd. A copy of the Stage 1 RSA report is enclosed at Appendix G.

3.2.3. WSP's designer's response report, which addresses the various comments made by Acorn Projects, is also enclosed at Appendix G.

3.2.4. The proposed site access junction layout has been amended to accord with comments made by the audit report. Drawing 0582-GA-002E is now withdrawn and it is superseded by drawing 0582-GA-002F. Copies of both drawings are also enclosed at Appendix G.

3.3 ACCIDENTS ON HALL ROAD

3.3.1. The Transport Assessment report considers accidents on the local highway network for the period between January 2012 and May 2017.

3.3.2. At the March 2018 meeting, ECC requested that the accident record for Hall Road should be updated in the light of a recent fatality on Hall Road.

3.3.3. Road traffic accident data has been obtained for Hall Road from ECC for the period May 2013 to April 2018.

3.3.4. WSP's briefing paper, which assesses traffic accidents on Hall Road during the above period, is enclosed at Appendix H. This paper considers the various sections of Hall Road and investigates if there are any clusters or patterns in the types of collisions that have occurred.

3.3.5. The briefing paper concludes that road users are the primary cause of the accidents recorded on Hall Road. The road layout is not cited as a contributory factor in any of the accidents recorded. Therefore, it is unlikely that the proposed development will make the road any less safe. As such It is considered that there are no highway safety related reasons for preventing development at Elsenham.

4 SUMMARY AND CONCLUSIONS

4.1 SUMMARY

4.1.1. An outline planning application for development on land located to the east of Elsenham was submitted in December 2017. The planning application was supported by a Transport Assessment report and a Residential Travel Plan.

4.1.2. Post-application discussions have been held with both highway authorities. Supplementary transport information has been provided to both authorities: that information has been drawn together in this Transport Assessment Addendum report.

4.1.3. Supplementary traffic information relating to an assessment of Bassingbourn Roundabout has been sent to Highways England. It is anticipated that this information will allow Highways England to withdraw its holding position with respect to the Elsenham planning application.

4.1.4. Traffic at the Grove Hill traffic signals in Stansted Mountfitchet was resurveyed in 2018.Traffic conditions in the central area of the town were also captured as part of the 2018 survey. WSP's VISSIM microsimulation model has been updated to include the results of the 2018 survey.

4.1.5. WSP's updated microsimulation modelling for Stansted Mountfitchet is described within Technical Note 03 Rev C. The technical note examines the impact of development at Elsenham on the Grove Hill traffic signals and the wider town centre area. It identifies the mitigation measures required to accommodate development at Elsenham.

4.1.6. Technical Note 03 Rev C supersedes the Stansted Mountfitchet microsimulation modelling described within the Transport Assessment report.

4.1.7. A Stage 1 road safety audit has been undertaken for the proposed site access junction. The junction layout contained within the Transport Assessment report is superseded by the updated layout 0582-SK-002F.

4.1.8. A supplementary road safety assessment has been undertaken for Hall Road. The assessment concludes that the proposed development will not have any significant effects with respect to the safety of users of Hall Road.

4.1.9. The results of the updated microsimulation modelling, together with a copy of the VISSIM model, have been forwarded to Essex County Council. The County Council has also been provided with the access junction Stage 1 RSA and the accidents assessment for Hall Road. It is anticipated that this information will enable Essex County Council to confirm that it does not object to the Elsenham planning application.

4.2 CONCLUSIONS

4.2.1. The assessment provided in the TA report and this TA Addendum continues to show that the proposed development will not have a severe impact on the operation of the strategic and local road networks.

4.2.2. It is intended that the Elsenham development will provide transport improvements including new bus stops, a walking and cycle connection to Elsenham Station and a pedestrian improvement scheme for Henham Road. These measures will provide benefits for existing and future residents at Elsenham.

4.2.3. In addition, the VISSIM microsimulation modelling undertaken for Stansted Mountfitchet has demonstrated that highway improvements in the form of amendments to the detector arrangements at the Grove Hill traffic signals is sufficient to mitigate the impact of development for 350 dwellings at Elsenham. As described above, those highway improvements will provide significant relief at the Grove Hill traffic signals which will benefit all road users.

4.2.4. To conclude, WSP has satisfied the requests by both highway authorities to provide further transport information. It is considered that the provision of that information (as described within this TA Addendum report) enables both authorities to fully consider the transport implications associated with the proposed development. It is anticipated that both Highways England and Essex County Council will be able to confirm that they do not object to the development proposed at Elsenham.

Appendix A

AECOM TECHNICAL NOTE 02

AECOM

Project:	**Highways England Spatial Planning Arrangement**	Job No:	**60506522 DX023.018**
Subject:	**Elsenham Transport Assessment Review**		
Prepared by:	**Catherine Durbin/John Paul Hipkin**	Date:	**28th February 2018**
Checked by:	**Liz Judson**	Date:	**1st March 2018**
Verified by:	**John Alderman**	Date:	**7th March 2018**
Approved by:	**John Alderman**	Date:	**9th March 2018**

Executive Summary

This Technical Note (TN02) has been prepared by AECOM on behalf of Highways England (HE) to document a review of a Transport Assessment (TA) prepared for a residential development in Elsenham. The proposals consist of 350 dwellings and a one form entry primary school, located on land off Henham Road, to the north east of Elsenham, within Uttlesford District, Essex. The TA has been prepared to support planning application reference UTT/17/3573/OP submitted to Uttlesford District Council in December 2017. AECOM previously reviewed documentation at the scoping stage in July 2017 and provided a number of recommendations. In addition to reviewing the associated TA, AECOM considered whether the previous recommendations have been noted or addressed.

Within the section detailing the policy documents referenced when preparing the TA no reference was made to DfT Circular 02/2013 or Highways England's 'The strategic road network: Planning for the future'. It is recommended that these documents are used as guidance if an assessment of the impact of development on the SRN is undertaken.

Uttlesford District Council's Draft Local Plan (Regulation 18) (2011 – 2033) only proposes an additional 40 dwellings to Elsenham over and above those already committed. If this proposed development site is not included within the forthcoming Local Plan document then there is a risk that the impact of the site on the highway network will not have been assessed through the plan process and measures identified to mitigate the impact of the site will not be identified within the plan.

AECOM acknowledge the identification of committed developments to be included within the assessment and consider that those identified are reasonable. Whilst AECOM consider that the background growth factors identified within the TA may be a little low, their use is considered to be acceptable.

The TA indicates that background growth from TEMPRO will not be applied to the local road network as the addition of committed development may result in growth higher than that predicted by TEMPRO. However, AECOM consider that this may not be applicable to all highway links, particularly on the SRN. If assessment of SRN junctions is to be undertaken then AECOM recommend that TEMPRO growth factors are calculated in order to predict the background traffic flows in the forecast year.

AECOM consider that the 2022 assessment year identified within the TA is reasonable to meet the requirements of DfT Circular 02/2013. However, it is also recommended that a 'review period' assessment of any relevant junctions on the SRN should also be undertaken based upon the end year of the Uttlesford emerging Local Plan period i.e. 2033.

[redacted]

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AECOM consider that the residential trip generation identified for the site is considered reasonable. However, it is recommended that consideration is given to the trip generation associated with staff trips at the school. These trips should also be subject to typical methods of trip distribution and assignment to the network to determine what their impact could be on the SRN.

AECOM consider that the trip distribution presented within the TA may slightly underestimate the number of longer distance strategic trips that could be made by residents of the proposed development site and considers therefore that the number of trips predicted to route via the SRN could be underestimated by WSP.

The TA provided further justification for the assignment of trips to the highway network, following queries raised by AECOM within the review of the Scoping Report. AECOM now consider that the assignment of trips to the network assumed within the TA is reasonable.

Whilst considered in isolation the number of additional trips at M11 Junction 8 may not warrant further assessment, it is likely that these additional trips will contribute towards a cumulative impact arising from multiple developments coming forward in the area. If full funding for an NPIF scheme at the junction has not been obtained then it is recommended that consideration is given to requesting a contribution to the scheme from the Elsenham development proposal.

It was previously recommended at the scoping stage (TN01) that the total number of vehicles predicted by AECOM to impact on the A120 Bassingbourn Roundabout warrants a junction capacity assessment and it was recommended that this is included within the forthcoming TA. AECOM consider that the predicted increase in vehicles routing through the junction is being underestimated. A junction capacity for the Bassingbourn Roundabout has not been included within and therefore AECOM are concerned that the impact of the development on this SRN junction is not understood. It is recommended that junction capacity assessments at the A120 Bassingbourn Roundabout are undertaken. The assessments undertaken should assess the operation of the roundabout, without and with development trips, for both the 2022 and 2033 assessment years identified. Consideration may need to be given to additional committed developments above those already included within the TA that would have an influence upon the operation of the roundabout. It should be noted that this development site is not currently included in the Local Plan and therefore will not be included in any cumulative assessment of the A120 Bassingbourn Roundabout that could be undertaken to support the Plan.

1 Introduction

1.1 This Technical Note (TN02) has been prepared by AECOM on behalf of Highways England (HE) to document a review of a Transport Assessment (TA) prepared for a residential development in Elsenham. The proposals consist of 350 dwellings and a one form entry primary school (including early years and childcare) on land off Henham Road, to the north east of Elsenham, within Uttlesford District, Essex. The TA has been prepared by WSP on behalf of the developers, Fairfield (Elsenham) Limited. The purpose of this TN is to inform Highways England of the potential impact of the proposed development on the operation of Strategic Road Network (SRN) and whether the highway impact assessment of the development has been reasonably assessed.

1.2 AECOM have previously reviewed the documentation associated with this development at the scoping stage in July 2017 (titled 'Land North East of Elsenham_ISSUED110717 and referred to as TN01 throughout this document). TN02 will consider whether the recommendations raised within TN01 have been noted or addressed by WSP.

1.3 This review will primarily focus on the impact of this development on M11 J8 and A120 junctions where the proposed development is anticipated to have the greatest impact on the SRN. The TN will also consider whether the extents of the highway impact assessments contained within the TA are reasonable.

1.4 The proposed site is located to the east of the village of Elsenham, Essex, and to the north of London Stansted Airport. The proposed development is situated five miles northeast of Bishop's Stortford and 14 miles west of Braintree.

1.5 The location of the development in relation to the SRN is shown below in Figure 1.

Figure 1 – SRN in the vicinity of the proposed development

1.6 The proposed development is located to the north of B1051 Henham Road. The planning application (UTT/17/3573/OP) was submitted to Uttlesford District Council, in December 2017 and is awaiting decision at the time of writing.

1.7 For ease of reference, AECOM's main comments and recommendations are presented in bold and underlined text throughout the note. Recommendations requiring immediate action are coloured **red.** Recommendations that are of concern but are not detrimental to agreement of this planning application are highlighted in **amber.**

2 Development Proposals

2.1 The development proposal consists of the following:

- 350 dwellings;
- A one form entry primary school (including early years and childcare);
- All vehicles road access from B1051 Henham Road; and
- Pedestrian and cyclist access point at Elsenham Station on Old Mead Road.

2.2 It is unclear from the proposals as to the size/capacity of the early years and childcare centres. It is also unclear whether these facilities will accommodate additional pupils to those outlined within the primary school. AECOM consider that pupil trips associated with these facilities will likely be internal to the site or may even fall outside the typical peak traffic hours, however, the staff will likely travel to and from these facilities similar to that of the primary school. It is therefore recommended that the proposals are fully outlined within the TA and that the staff trips for the primary school are included within the trip generation calculations. The implications of this are discussed in further detail in the trip generation section of the TN.

3 Policy Context

3.1 WSP's TA has included the review of the following policy documents, to determine how the proposed development aligns with their policies:

- National Planning Policy Framework (NPPF) March 2012;
- Essex Local Transport Plan 2011;
- Uttlesford District Council Local Plan 2005;
- Draft Uttlesford Local Plan – Draft Regulation 18 Local Plan;
- Essex County Council Parking Standards, Design and Good Practise, September 2009; and
- DfT National travel Survey, 2016.

3.2 AECOM consider that the documents outlined above are relevant policy documents for review. However, AECOM recommend that reference is made to DfT Circular 02/2013, which provides guidance regarding how the impact of the proposed development on the SRN should be assessed, together with Highways England's 'The strategic road network: Planning for the future (A guide to working with Highways England on planning matters)'.

3.3 Uttlesford District Council consulted on their Draft Local Plan (Regulation 18) (2011 – 2033) in September 2017. Uttlesford District Council Local Development Scheme published in February 2018 anticipates that a consultation on the Pre-submission Local Plan will be undertaken in summer 2018. The Draft Local Plan only proposes an additional 40 dwellings to Elsenham over and above those already committed. It is unknown if this proposed dwelling numbers will be increased within the Pre-Submission document. If this proposed development site is not included within the forthcoming Local Plan document then there is a risk that the impact of the site on the highway network will not have been assessed through the plan process and measures identified to mitigate the impact of the site will not be identified within the plan.

4 Current Transport Conditions

4.1 The development site is situated within close proximity to Elsenham train station which serves Stansted Mountfitchet, Bishop's Stortford, Cambridge and London. The TA states that cycle and walking access points to the train station will be developed as part of the site. AECOM welcome this approach as short attractive journeys to the train station from the development could help to reduce the amount of strategic trips using the SRN.

4.2 Existing bus services serve Saffron Walden, Bishop Stortford, Takeley and Stansted Airport and vary in their frequencies. However, the anticipated popular destinations of Stansted Airport and Bishop's Stortford have a reasonable service, with intervals varying between 50 and 70 minutes.

4.3 For development trips wishing to make lengthier strategic trips, the M11 Junction 8 is the closest point of access to the SRN for trips travelling north or south from the development. For strategic trips travelling east or west, motorists are likely route via A120 and will also likely to use the A120 Junctions for accessing M11 J8.

4.4 AECOM are aware of Stansted Airport's intention to increase passenger numbers to 44.5 million passengers per annum. This significant increase from current passenger numbers is anticipated to have a significant impact on the operation of M11 J8.

5 Committed Developments

5.1 AECOM notes that WSP have highlighted major committed train and network improvements within the area, including the proposed improvements to M11 J8 as part of a National Productivity Investment Fund (NPIF) bid submitted by Essex County Council (ECC). AECOM understand from recent discussions with HE that this NPIF bid has been successful.

5.2 In addition, WSP have identified a number of committed developments within the TA that are within Elsenham and Stansted Mountfitchet. These are presented within Table 1 below. AECOM consider that if assessments of junctions of the SRN are required, additional committed developments may need to be considered.

Table 1: Committed Developments included in WSP's 2022 Baseline

DEVELOPMENT	LOCATION	DEVELOPMENT
Land West of Hall Road	South-East Elsenham	130 dwellings
Land Adjacent to Hailes Wood	East Elsenham	32 dwellings
Elsenham Nurseries	South-West Elsenham	40 dwellings
Land North of Stansted Road	West Elsenham	155 dwellings
Land South of Stansted Road	South-West Elsenham	165 dwellings
Land North of Leigh Drive	South-West Elsenham	20 dwellings
Land at Walpole Farm	North Stansted Mountfitchet	147 dwellings
Land at Elms Farm	East Stansted Mountfitchet	53 dwellings
Trisail (part)	Gaunt's End, Elsenham	B1 office - GFA 6,969sqm
Elsenham Primary School	Elsenham	Expansion from 1FE to 2FE
Land North of Water Lane	Stansted Mountfitchet	10 dwellings
Magna Carta School	St John's Road, Stansted Mountfitchet	1FE Primary School

5.3 WSP have used the associated TA documents of each development to determine the predicted development trips and assign these development trips of each committed development to the network.

5.4 At the time of the traffic surveys in February 2017, WSP state that proportions of some of these developments had already been built out and therefore the proportionate development trips have not been assigned to the network in some cases, an approach that AECOM consider reasonable.

6 Growth Factors and Assessment Years

6.1 WSP state that traffic growth factors were calculated using TEMPRO, however, the version of TEMPRO used has not been presented within the TA. AECOM have undertaken their own TEMPRO assessment (Version 7.2) and are unable to replicate the growth figures presented by WSP. Table 2 below illustrates the differences between WSP and AECOM's TEMPRO growth factors:

Table 2: TEMPRO Growth Factor Comparison – 2017-2022 Rural All Roads

2017-2022	AM	PM
WSP	6.69%	6.95%
AECOM	7.59%	7.25%

6.2 Table 2 demonstrates that AECOM consider that the values used by WSP are slightly underestimating the growth in the area, however the difference between the values is considered to be minimal and therefore AECOM accept the use of the values presented by WSP.

6.3 Within Table 5.3 of the TA, WSP demonstrate that once the committed developments trips are assigned to the local road network there is an increase to the link flows on certain arms from 2017 to 2022. WSP state that the application of the predicted committed development traffic results in traffic flow increases on some link roads that is significantly higher than the background traffic growth calculated in TEMPRO. WSP state that to avoid double counting these development trips WSP will not apply TEMPRO growth factors to future year flows.

6.4 AECOM consider that, whilst on some local road links the addition of committed development may result in growth higher than that predicted by TEMPRO; this may not be applicable to all highway links, particularly on the SRN. If assessment of SRN junctions are undertaken then AECOM recommend that TEMPRO growth factors are calculated (including the removal of the number of dwellings and jobs associated with the committed developments via the 'Alternative Assumptions' tool) in order to predict the background traffic flows in the forecast year.

6.5 AECOM recommend that future year traffic growth should be built using the following principles:

- Base Year Flow;
- Base Year Flow + Background Growth;
- Base Year Flow + Background Growth + Committed Development(s); and
- Base Year Flow + Background Growth + Committed Development(s) + Development trips.

6.6 Section 2.3.3 of the TA indicates that the development construction is expected to take place between 2019 and 2021/2022. The TA states that a 2022 future assessment year has been adopted. The DfT Circular 02/2013 indicates that an opening year assessment should be undertaken (including full development) and that any mitigation measures that are identified for the SRN should be based on this opening year assessment. AECOM consider that the 2022 assessment year fulfils this requirement; however, the DfT Circular also indicates that a future year 'review period' assessment should be undertaken (10 years after the planning application is submitted or at the end of the relevant Local Plan period, whichever is later). **AECOM recommend that a 'review period' assessment of the relevant junctions on the SRN should also be undertaken based upon the end year of the Uttlesford emerging Local Plan period of 2033.**

7 Trip Generation

7.1 WSP has used vehicle trip rates from a previous application in 2013 to predict the number of vehicle trips generated by the proposed development. AECOM reviewed the trip rates in TN01 and considered that they were reasonable, therefore this conclusion remains.

7.2 WSP state that the majority of trips associated with the new primary school will remain internal to the development site. AECOM consider that although it is likely that a significant proportion of pupil trips will likely be internal to the site, there may be some trips that are external to the site. However, AECOM consider that the chances of any external pupil trips making use of the SRN are very small and therefore from HE perspective the assumption that all pupil trips remaining internal to the site is considered acceptable.

7.3 AECOM note that there is no discussion of staff trips associated with the proposed school. AECOM consider that all of these trips are unlikely to be internal to site and that staff would likely travel from further afield, with a proportion making use of the SRN. **It is therefore recommended that staff trips are subject to typical methods of trip generation, distribution and assignment to the network to determine what their impact could be on the SRN. Furthermore, this should include the staff associated with the early learning years and childcare centres. It is recommended that this is fully outlined within a revised TA.**

8 Trip Distribution

8.1 WSP has utilised 2011 Census Journey to Work (JTW) data for the Uttlesford 005 Middle Super Output Area (MSOA) (E02004595) to predict vehicle trip distribution.

8.2 Similar to the scoping stage, WSP have conducted a more detailed local distribution analysis covering the rural areas around Elsenham, using Output Areas, the smallest geographical area from the 2011 Census. The workplace population for the Output Areas has been used to produce a distribution for this area, excluding Elsenham itself, as it has been assumed that journeys to work within Elsenham from the proposed development would be made by foot and bicycle. AECOM considers this approach reasonable.

8.3 AECOM undertook their own vehicle trip distribution using 2011 Census JTW data for the same MSOA – Uttlesford 005 (E020045959). As highlighted in TN01, AECOM consider that the distribution presented may slightly underestimate the number of longer distance strategic trips that could be made by residents of the proposed development site and considers therefore that the number of trips predicted to route via the SRN could be underestimated by WSP. The trip distribution percentage difference between AECOM and WSP can be found in Table 3 below:

Table 3: Trip Distribution Percentage Comparison

Junction	WSP	AECOM
M11 Junction 8 Roundabout	5%	3%
M11 J8 sliproads (M11 J8 combined)	19% (24%)	29% (32%)
A120 Priory Wood Roundabout	14%	19%
A120 Bassingbourn Roundabout	17%	23%

8.4 The difference between AECOM and WSP's predicted trips routing through the SRN is detailed later within the note.

9 Trip Assignment

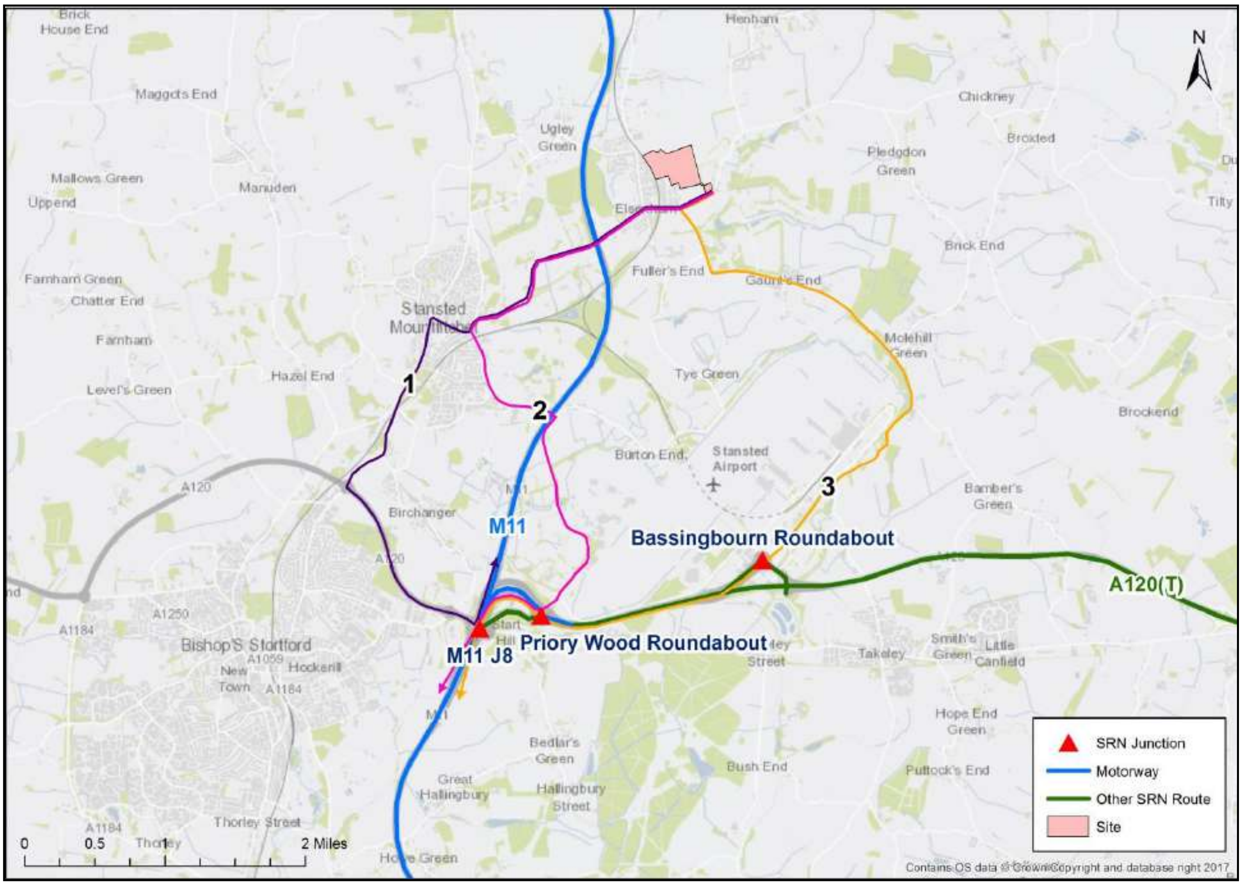
9.1 WSP has split the trip assignment into two categories. Strategic destinations are analysed at MSOA level and local destinations at Output Area Level.

9.2 Sixteen routes have been identified for local trips. The only local route that makes use of the SRN is East Essex, via Thremhall Avenue, Bassingbourn Roundabout and the A120 eastbound. AECOM considers this a reasonable assignment path.

9.3 Within TN01, AECOM contested that the assigned strategic routes to M11 J8 may not be representative of the typical routes to the SRN and were concerned that the impact at Bassenbourn Roundabout and M11 Junction 8 was being underestimated.

9.4 A diagram of M11 strategic assignment routes identified by WSP and AECOM is shown below. Routes 2 and 3 were identified by WSP, while Route 1 has only been identified by AECOM. It should be noted that the route numbers below are not consistent with those identified by WSP; they have been allocated independently by AECOM for their analysis purposes.

Figure 2: Possible routes of vehicle trips assigning from the proposed development to the M11



9.5 WSP's route assignment uses a 50/50 split between Priory Wood Roundabout and Bassingbourn Roundabout (Routes 2 and 3), regardless of direction on the M11.

9.6 AECOM considered that the M11 and East routes via Hall Road / Bassingbourn Roundabout are reasonable assignment paths.

9.7 As outlined within TN01, AECOM's route assignment uses Route 1 for M11 northbound trips and Route 3 for M11 southbound trips. These routes were based off those suggested by Google Maps journey planning.

9.8 Following a recommendation by AECOM within their Scoping Note to reconsider the routing based on the direction of the vehicles, WSP have provided the following reasons to maintain their previous assignment of routes 2 and 3 (illustrated in Figure 2 above):

- Hall Road - Thremhall Avenue - M11 avoids routing through Stansted Mountfitchet and also provides direct access to the south facing free flow M11 on-off slips at Junction 8;
- B1051 - Church Road - Bury Lodge Lane - M11 also provides direct access to the free flow M11 south facing slips at Junction 8 of the M11, although routes via Grove Hill and the Lower Street / Church Road / Chapel Hill mini-roundabout in Stansted Mountfitchet;

- The Trafficmaster Data shows that the AM peak period southbound journey times between the Hall Road and Bury Lodge Lane routes are similar (13 mins 15 seconds and 12 mins 34 seconds respectively); and

- The Trafficmaster Data shows that PM peak period northbound journey times between the Hall Road and Bury Lodge Lane routes are similar (12 mins 23 seconds and 11 mins 56 seconds).

9.9 AECOM have reconsidered WSP's strategic assignment network flows and consider that a 50/50 split for trips to/from the M11 between Hall Road – Thremhall Avenue and B1051 – Church Road is reasonable. A comparison between the vehicle trip impacts on the SRN predicted by WSP and AECOM, based on the different distribution assumptions, is shown in the table below.

Table 4: Comparison of impact of proposed development at SRN junctions

Junction	WSP		AECOM	
	AM Trips	PM Trips	AM Trips	PM Trips
M11 Junction 8 Roundabout	9	9	6	6
(including through slip roads)	42	45	56	61
A120 Priory Wood Roundabout	25	26	34	37
A120 Bassingbourn Roundabout	30	32	40	43

9.10 Table 4 indicates that AECOM and WSP's development trips predicted to route through the M11 J8 roundabout are similar. AECOM consider that the development trips anticipated to route through the M11 J8 roundabout will unlikely have a material impact on the operation of the roundabout itself.

9.11 Whilst considered in isolation the number of additional trips at M11 Junction 8 may not warrant further assessment, it is likely that these additional trips will contribute towards a cumulative impact arising from multiple developments coming forward in the area. It is unclear whether full funding has been obtained to support the National Productivity Investment Fund (NPIF) scheme. **If full funding has not been obtained, it is recommended that consideration is given to requesting a contribution to the scheme from the Elsenham development proposal.**

9.12 It was previously recommended within TN01, that the total number of vehicles predicted by AECOM to impact on the A120 Bassingbourn Roundabout warrants a junction capacity assessment and it was recommended that this is included within a the forthcoming TA. Upon review, AECOM consider that the amount of trips routing through Bassingbourn junction are still being underestimated. A junction capacity for the Bassingbourn Roundabout has not been included and therefore AECOM are still concerned that the impact of the development on this SRN junction is not understood.

10 Highway Impact and Potential Mitigation Measures

10.1 As highlighted in Table 4**,** there is expected to be a material increase in vehicles predicted to route through the A120 Bassingbourn Roundabout. WSP have not currently undertaken junction capacity assessments of SRN junctions and have not identified mitigation measures for these junctions.

10.2 WSP state that two-way traffic flows at the A120 Bassingbourn Roundabout are predicted to increase by a maximum of 2% in the AM and PM peak hours. WSP state that the proposed development will have a minimal impact on the operation of this junction and therefore neither a detailed capacity assessment nor mitigation measures are required.

10.3 AECOM consider that a percentage increase comparison of development trips against total trips is not an indication that the increase in trips could have on the junction operation. AECOM consider that over 40 development trips would route through the A120 Bassingbourn Roundabout in both the AM and PM peaks. AECOM consider that this increase in trips could cause a material impact on the junction. **It is therefore recommended that a junction capacity assessment is undertaken to understand the impact of the development on the operation of the roundabout. The assessments undertaken should assess the operation of the roundabout, without and with development trips, for both the 2022 and 2033 assessment years identified. Consideration may need to be given to additional committed developments above those already included within the TA that would have an influence upon the operation of the roundabout.** If the impact upon the operation of the junction from the proposed development is considered to be severe then measures may be required to mitigate that impact. It should be noted that this development site is not currently included in the Local Plan and therefore will not be included in any cumulative assessment of the A120 Bassingbourn Roundabout that could be undertaken to support the Plan.

11 Conclusion

11.1 This Technical Note (TN02) has been prepared by AECOM on behalf of Highways England (HE) to document a review of a Transport Assessment (TA) prepared for a residential development in Elsenham. AECOM previously reviewed documentation at the scoping stage in July 2017 and provided a number of recommendations. In addition to reviewing the associated TA, AECOM considered whether the previous recommendations have been noted or addressed.

11.2 AECOM have raised a number of recommendations throughout this note, which are underlined for ease of reference. It is recommended that these are addressed by WSP to ensure the potential impacts of the development on the strategic road network (SRN) are fully assessed and understood. The key recommendations are summarised below:

- Within the section detailing the policy documents referenced when preparing the TA no reference was made to DfT Circular 02/2013. It is recommended that this document is used as guidance if assessment of the impact of development on the SRN is to be undertaken, together with Highways England's 'The strategic road network: Planning for the future (A guide to working with Highways England on planning matters)'.
- Uttlesford District Council's Draft Local Plan (Regulation 18) only allocates an additional 40 dwellings to Elsenham over and above those already committed. It is unknown if the proposed dwelling numbers will be increased within the Pre-Submission document. If this proposed development site is not included within the forthcoming Local Plan document then there is a risk that the impact of the site on the highway network will not have been assessed through the plan process and any measures identified to mitigate the impact of the site will not be identified within the plan.
- AECOM acknowledge the identification of committed developments to be included within the assessment and consider that those identified are reasonable for the assessment presented.

At the time of the traffic surveys in February 2017, WSP state that proportions of some of these developments had already been built out and therefore the proportionate development trips have not been assigned to the network in some cases, an approach that AECOM consider reasonable.

- AECOM consider that the TEMPRO growth factors presented within the TA are considered to be slightly underestimating the potential background growth in the area. However, the differences between the values in the TA and those calculated by AECOM are fairly minimal and therefore the factors included within the TA are considered acceptable.

- The TA indicates that background growth from TEMPRO will not be applied to the local road network as the addition of committed development may result in growth higher than that predicted by TEMPRO. However, AECOM consider that this may not be applicable to all highway links, particularly on the SRN. If further assessment of SRN junctions are undertaken then AECOM recommend that TEMPRO growth factors are calculated in order to predict the background traffic flows in the forecast year.

- AECOM consider that the 2022 assessment year identified within the TA is reasonable to meet the requirements of DfT Circular 02/2013, which requires an assessment in the opening year of the development. However, the Circular also indicates that a future year 'review period' assessment should be undertaken (10 years after the planning application is submitted or at the end of the relevant Local Plan period, whichever is later). AECOM recommend that a 'review period' assessment of any relevant junctions on the SRN should also be undertaken based upon the end year of the Uttlesford emerging Local Plan period i.e. 2033.

- AECOM consider that the residential trip generation identified for the site is considered reasonable. However, it is recommended that further consideration is given to the trip generation associated with staff trips at the school. These trips should also be subject to typical methods of trip distribution and assignment to the network to determine what their impact could be on the SRN.

- AECOM undertook checks on the trip distribution identified within the TA and consider that the distribution presented may slightly underestimate the number of longer distance strategic trips that could be made by residents of the proposed development site and considers therefore that the number of trips predicted to route via the SRN could be underestimated by WSP.

- The TA provided further justification for the assignment of trips to the highway network, following queries raised by AECOM within the review of the Scoping Report. AECOM now consider that the assignment of trips to the network assumed within the TA is reasonable.

  Whilst considered in isolation the number of additional trips at M11 Junction 8 may not warrant further assessment, it is likely that these additional trips will contribute towards a cumulative impact arising from multiple developments coming forward in the area. It is unknown whether full funding has been obtained to support the NPIF scheme. If full funding of the NPIF scheme has not been obtained, it is recommended that consideration is given to requesting a contribution to the scheme from the Elsenham development proposal.

- It was previously recommended within TN01, that the total number of vehicles predicted by AECOM to impact on the A120 Bassingbourn Roundabout warrants a junction capacity assessment and it was recommended that this is included within the forthcoming TA. AECOM still consider that the predicted increase in vehicles routing through the junction is being underestimated. A junction capacity for the Bassingbourn Roundabout has not been included within and therefore AECOM are still concerned that the impact of the development on this SRN junction is not understood. Furthermore, AECOM consider that the number of trips predicted to impact on the A120 Bassingbourn Roundabout in the TA could be an underestimate and it is recommended that consideration is given to making use of the total development trips predicted by AECOM to route via the junction.

- It is recommended that junction capacity assessments at the A120 Bassingbourn Roundabout are undertaken. The assessments undertaken should assess the operation of the roundabout, without and with development trips, for both the 2022 and 2033 assessment years identified. Consideration may need to be given to additional committed developments above those already included within the TA that would have an influence upon the operation of the roundabout. This development site is not currently included in the Local Plan and therefore will not be included in any cumulative assessment of the A120 Bassingbourn Roundabout that could be undertaken to support the Plan.

Appendix B

ASSESSMENT OF BASSINGBOURN ROUNDABOUT

TECHNICAL NOTE 04

TO	AECOM (for Highways England)	FROM	WSP in the UK
DATE	**01 August 2018**	**CONFIDENTIALITY**	**Public**
SUBJECT	**Bassingbourn Roundabout Modelling**		

1 Introduction

1.1 WSP in the UK were commissioned by Fairfield (Elsenham) Ltd to produce Transport Assessment (TA) and Framework Residential Travel Plan (RTP) in support of their planning application (UTT/17/3573/OP) for the development of 350 dwellings and a one form entry primary school on land to the East of Elsenham, Essex.

1.2 The location of the development relative to the Bassingbourn Roundabout, a 4.2 mile (6.8 km or 8 minutes) drive to the south via Hall Road and M11 Junction 8, a 5.3 miles (8.5 km or 15 minutes) drive via Stansted Mountfitchet, is shown indicatively in **Figure 1.1**.

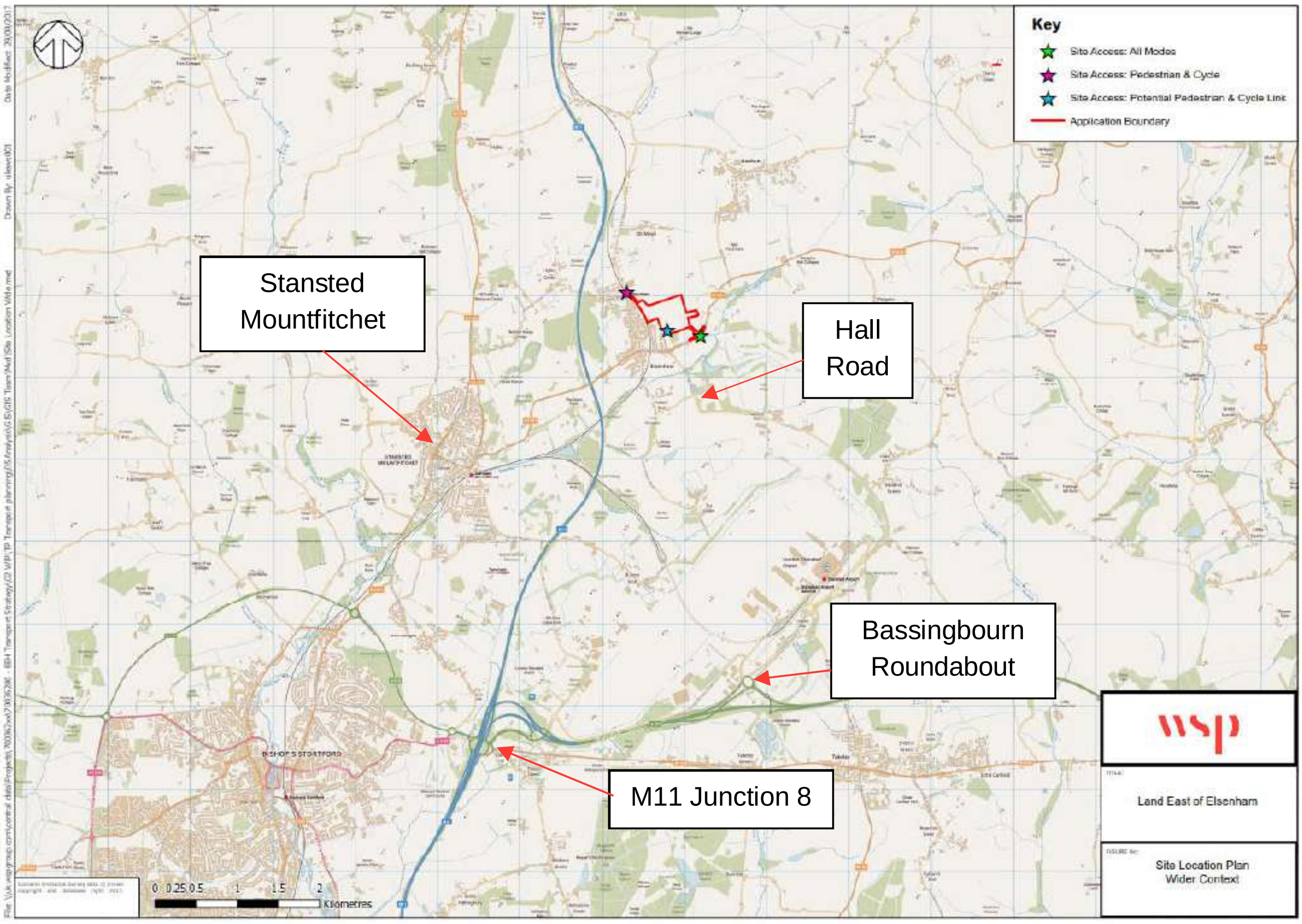


Figure 1.1 – **Site Location relative to the A120 Bassingbourn Roundabout**

1.3 This technical note has been produced in response to AECOM's Technical Note 02 prepared on behalf of Highways England (dated 28 February 2018 and approved 9 March 2018) and follows the same structure of their review with the comments presented by AECOM shown in *italics* and the WSP response below. Particularly, this response considers the impact of the residential development proposals upon the Bassingbourn Roundabout at Stansted Airport and the A120. WSP met Highways England officers and AECOM on 2 May 2018 to discuss AECOM's Technical Note 2.

2 Development Proposals

2.1 The development proposal consists of the following:

- *350 dwellings;*
- *A one form entry primary school (including early years and childcare);*
- *All vehicles road access from B1051 Henham Road; and*
- *Pedestrian and cyclist access point at Elsenham Station on Old Mead Road.*

2.2 It is unclear from the proposals as to the size/capacity of the early years and childcare centres. It is also unclear whether these facilities will accommodate additional pupils to those outlined within the primary school. AECOM consider that pupil trips associated with these facilities will likely be internal to the site or may even fall outside the typical peak traffic hours, however, the staff will likely travel to and from these facilities similar to that of the primary school. It is therefore recommended that the proposals are fully outlined within the TA and that the staff trips for the primary school are included within the trip generation calculations. The implications of this are discussed in further detail in the trip generation section of the TN.

The outline planning application (UTT/17/3573/OP) indicates that the early years and childcare facilities shall be for up to 56 places.

WSP agree with you as to the internalisation of pupil trips however, we also consider that there would be an element of internalisation of trips by staff and those not internal are likely to be local and travel sustainably. If there is a very small element of external trips by staff not from the local area with dilution through distribution and assignment the impact upon the SRN will be negligible and would not warrant altering the agreed trip rates for the development.

3 Policy Context

3.1 WSP's TA has included the review of the following policy documents, to determine how the proposed development aligns with their policies:

- *National Planning Policy Framework (NPPF) March 2012;*
- *Essex Local Transport Plan 2011;*
- *Uttlesford District Council Local Plan 2005;*
- *Draft Uttlesford Local Plan – Draft Regulation 18 Local Plan;*
- *Essex County Council Parking Standards, Design and Good Practise, September 2009; and*
- *DfT National travel Survey, 2016.*

3.2 AECOM consider that the documents outlined above are relevant policy documents for review. However, AECOM recommend that reference is made to DfT Circular 02/2013, which provides guidance regarding how the impact of the proposed development on the SRN should be assessed, together with Highways England's 'The strategic road network: Planning for the future (A guide to working with Highways England on planning matters)'.

WSP agree with AECOM that the policy documents outlined above are relevant and also that reference should be made to the DfT Circular 02/2013 and Highways England's 'The strategic road network: Planning for the future (A guide to working with Highways England on planning matters)'.

<u>DfC Circular 02/2013 The Strategic Road Network and the Delivery of Sustainable Development (Sep 2013)</u>

The DfT Circular 02/2013 'The Strategic Road Network and the Delivery of Sustainable Development' was published September 2013 and explains how the former Highways Agency (now Highways England) will engage with the planning system to deliver sustainable development. Within the document the Highways Agency commits to supporting economic development and recognises the role the Strategic Road Network (SRN) plays in this, 'a well-functioning strategic road network enables growth by providing for safe and reliable journeys'.

Paragraph 9 states that 'development proposals are likely to be acceptable if they can be accommodated within the existing capacity of a section (link or junction) of the strategic road network, or they do not increase demand for use of a section that is already operating at over-capacity levels, taking account of any travel plan, traffic management and/or capacity enhancement measures that may be agreed.

Furthermore, a 'development should only be prevented or refused on transport grounds where the residual cumulative impacts of development are severe'.

Paragraph 25 of the circular considers that a developments impact upon the existing road network capacity should be considered over a period of up to 10 years.

However, **Paragraph 27** also states that where the overall forecast demand at the time of opening of the development can be accommodated by the existing infrastructure no further capacity mitigation will be sought for subsequent years.

Paragraphs 28 to **30** highlight the importance of the Travel Plan process as an effective form of mitigation, managing the impact of development proposals and reducing the need for major transport infrastructure.

<u>The strategic road network: Planning for the future (A guide to working with Highways England on planning matters)</u>

Following the rebranding of The High Authority to Highways England (HE) a further guide was published in September 2015, 'The strategic road network: Planning for the future (A guide to working with Highways England on planning matters)'. The 2015 HE Guide reaffirms the new Highways England's commitment to supporting economic growth where proposals can be accommodated within the existing capacity of the SRN.

The guide also recommends assessment at the opening year of a development and a date ten years after the registration of planning or the end of the local plan period (whichever is greater). The planning application was registered in 2017 and the Emerging Draft Local Plan for Uttlesford covers the period 2011-2033.

The guide also reaffirms the desire to mitigate traffic impacts through the Travel Plan process and thus reduce the need for physical measures.

3.3 *Uttlesford District Council consulted on their Draft Local Plan (Regulation 18) (2011 – 2033) in September 2017. Uttlesford District Council Local Development Scheme published in February 2018 anticipates that a consultation on the Pre-submission Local Plan will be undertaken in summer 2018. The Draft Local Plan only proposes an additional 40 dwellings to Elsenham over and above those already committed. It is unknown if this proposed dwelling numbers will be increased within the Pre-Submission document. If this proposed development site is not included within the forthcoming Local Plan document then there is a risk that the impact of the site on the highway network will not have been assessed through the plan process and measures identified to mitigate the impact of the site will not be identified within the plan.*

As indicated by AECOM this is only a draft plan and may be subject to change within the pre-submission document of the local plan, nonetheless this technical note has been produced to fulfil any analysis short fall, particularly with regards to the capacity of SRN at the Bassingbourn Roundabout.

4 Current Transport Conditions

4.1 *The development site is situated within close proximity to Elsenham train station which serves Stansted Mountfitchet, Bishop's Stortford, Cambridge and London. The TA states that cycle and walking access points to the train station will be developed as part of the site. AECOM welcome this approach as short attractive journeys to the train station from the development could help to reduce the amount of strategic trips using the SRN.*

WSP welcomes AECOM's agreement as to the walking cycling access strategy and the potential for this to reduce car trips, particularly on the SRN. In order to maximise this WSP produced a Framework Residential Travel Plan (TP) to accompany the December 2017 Transport Assessment (TA).

4.2 *Existing bus services serve Saffron Walden, Bishop Stortford, Takeley and Stansted Airport and vary in their frequencies. However, the anticipated popular destinations of Stansted Airport and Bishop's Stortford have a reasonable service, with intervals varying between 50 and 70 minutes.*

WSP agree with the AECOM finding that the bus services to anticipated popular destinations can be considered as reasonable.

4.3 *For development trips wishing to make lengthier strategic trips, the M11 Junction 8 is the closest point of access to the SRN for trips travelling north or south from the development. For strategic trips travelling east or west, motorists are likely route via A120 and will also likely to use the A120 Junctions for accessing M11 J8.*

4.4 *AECOM are aware of Stansted Airport's intention to increase passenger numbers to 44.5 million passengers per annum. This significant increase from current passenger numbers is anticipated to have a significant impact on the operation of M11 J8.*

WSP note that AECOM consider car bourne trips from the development may utilise the A120 Junctions for accessing the M11 Junction 8 and we present the following analysis which demonstrates that the impacts of the proposals can easily be accommodated with the existing capacity on SRN as per the DfT Circular 02/2013 and the subsequent HE guide.

5 Committed Developments

5.1 *AECOM notes that WSP have highlighted major committed train and network improvements within the area, including the proposed improvements to M11 J8 as part of a National Productivity Investment Fund (NPIF) bid submitted by Essex County Council (ECC). AECOM understand from recent discussions with HE that this NPIF bid has been successful.*

5.2 *In addition, WSP have identified a number of committed developments within the TA that are within Elsenham and Stansted Mountfitchet. These are presented within Table 1 below. AECOM consider that if assessments of junctions of the SRN are required, additional committed developments may need to be considered.*

Table 1: Committed Developments included in WSP's 2022 Baseline

DEVELOPMENT	LOCATION	DEVELOPMENT
Land West of Hall Road	South-East Elsenham	130 dwellings
Land Adjacent to Hailes Wood	East Elsenham	32 dwellings
Elsenham Nurseries	South-West Elsenham	40 dwellings
Land North of Stansted Road	West Elsenham	155 dwellings
Land South of Stansted Road	South-West Elsenham	165 dwellings
Land North of Leigh Drive	South-West Elsenham	20 dwellings
Land at Walpole Farm	North Stansted Mountfitchet	147 dwellings
Land at Elms Farm	East Stansted Mountfitchet	53 dwellings
Trisail (part)	Gaunt's End, Elsenham	B1 office - GFA 6,969sqm
Elsenham Primary School	Elsenham	Expansion from 1FE to 2FE
Land North of Water Lane	Stansted Mountfitchet	10 dwellings
Magna Carta School	St John's Road, Stansted Mountfitchet	1FE Primary School

5.3 *WSP have used the associated TA documents of each development to determine the predicted development trips and assign these development trips of each committed development to the network.*

5.4 *At the time of the traffic surveys in February 2017, WSP state that proportions of some of these developments had already been built out and therefore the proportionate development trips have not been assigned to the network in some cases, an approach that AECOM consider reasonable.*

WSP note AECOM's identification of the comprehensive list of committed infrastructure and developments that was established in scoping. WSP also welcome AECOM agreement as to the processing of committed trips from partially built out developments.

6 Growth Factors and Assessment Years

6.1 *WSP state that traffic growth factors were calculated using TEMPRO, however, the version of TEMPRO used has not been presented within the TA. AECOM have undertaken their own TEMPRO assessment (Version 7.2) and are unable to replicate the growth figures presented by WSP. Table 2 below illustrates the differences between WSP and AECOM's TEMPRO growth factors:*

Table 2: TEMPRO Growth Factor Comparison – 2017-2022 Rural All Roads

2017-2022	AM	PM
WSP	6.69%	6.95%
AECOM	7.59%	7.25%

6.2 *Table 2 demonstrates that AECOM consider that the values used by WSP are slightly underestimating the growth in the area, however the difference between the values is considered to be minimal and therefore AECOM accept the use of the values presented by WSP.*

WSP note the acceptance of AECOM as to the Tempro growth rates derived in the Transport Assessment. In the interest of robustness WSP have used values closer to those derived by AECOM for the following analysis of the SRN at the Bassingbourn Roundabout. National Traffic Model (NTM) adjusted predicted government economic growth figures from the Tempro database (V7.2) for an average of the Census Super Output Middle Layers Uttlesford 005 and 006 have been utilised in the following analysis. The resultant 2017 to 2022 growth factors are contained in **Table 1.1**.

2017-2022	
AM	1.0735
PM	1.0715

Table 1.1 – 2017 – 2022 Tempro derived Growth Factors

6.3 *Within Table 5.3 of the TA, WSP demonstrate that once the committed developments trips are assigned to the local road network there is an increase to the link flows on certain arms from 2017 to 2022. WSP state that the application of the predicted committed development traffic results in traffic flow increases on some link roads that is significantly higher than the background traffic growth calculated in TEMPRO. WSP state that to avoid double counting these development trips WSP will not apply TEMPRO growth factors to future year flows.*

6.4 *AECOM consider that, whilst on some local road links the addition of committed development may result in growth higher than that predicted by TEMPRO; this may not be applicable to all highway links, particularly on the SRN. If assessment of SRN junctions are undertaken then AECOM recommend that TEMPRO growth factors are calculated (including the removal of the number of dwellings and jobs associated with the committed developments via the 'Alternative Assumptions' tool) in order to predict the background traffic flows in the forecast year.*

6.5 *AECOM recommend that future year traffic growth should be built using the following principles:*

- *Base Year Flow;*
- *Base Year Flow + Background Growth;*
- *Base Year Flow + Background Growth + Committed Development(s); and*
- *Base Year Flow + Background Growth + Committed Development(s) + Development trips.*

6.6 *Section 2.3.3 of the TA indicates that the development construction is expected to take place between 2019 and 2021/2022. The TA states that a 2022 future assessment year has been adopted. The DfT Circular 02/2013 indicates that an opening year assessment should be undertaken (including full development) and that any mitigation measures that are identified for the SRN should be based on this opening year assessment. AECOM consider that the 2022 assessment year fulfils this requirement; however, the DfT Circular also indicates that a future year 'review period' assessment should be undertaken (10 years after the planning application is submitted or at the end of the relevant Local Plan period, whichever is later).* ***AECOM recommend that a 'review period' assessment of the relevant junctions on the SRN should also be undertaken based upon the end year of the Uttlesford emerging Local Plan period of 2033****.*

Whilst there will be an element of double counting, as the previous TEMPRO growth factors included the predicted economic growth bespoke to the area, WSP note that in the interests of robustness it is considered by AECOM that the growth due to committed developments should be included over and above TEMPRO in analysis of the SRN. WSP also note that AECOM recommend assessment of the SRN be undertaken based upon the end year of the emerging draft Local Plan for Uttlesford (2033). The following analysis presents the TEMPRO growth factors to 2033 and the resultant analysis at the Bassingbourn roundabout in both 2022 and 2033.

Bassingbourn Roundabout Analysis:

Observed Traffic Flows/ Base Traffic Model

Traffic flows at the Bassingbourn Roundabout were observed 9 February 2017 and these are shown indicatively for the AM and PM peak hours in terms of PCU's in **Figure 1.2**.

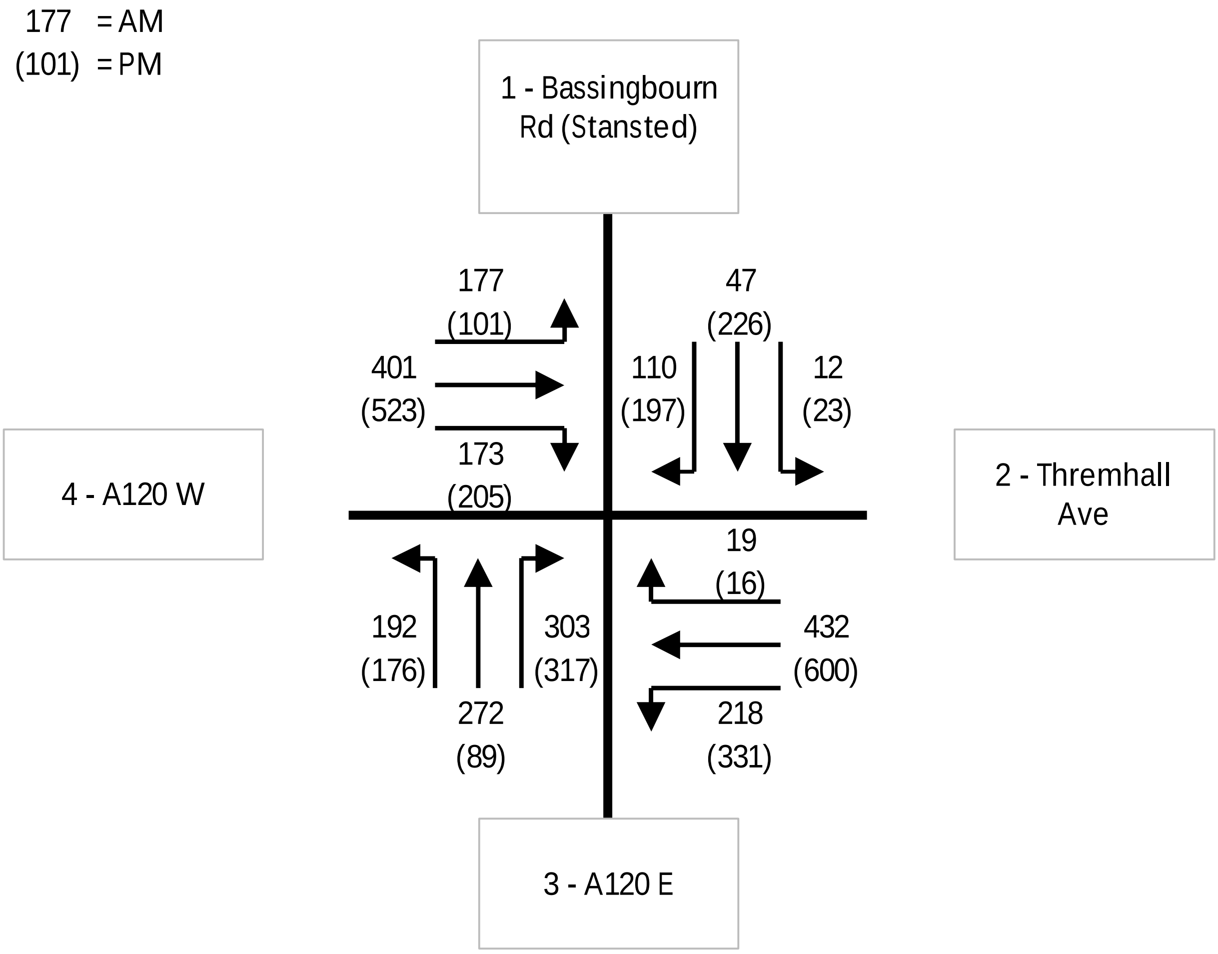


Figure 1.2 – 2017 Observed Traffic Counts (PCUs)

To gain an understanding as to how the Bassingbourn Roundabout is currently operating an industry standard Junctions 9 model (with the ARCADY module) was constructed using the large roundabout parameters. The results of this 2017 model using the observed flows are summarised in **Table 1.2** for the peak 15 minutes within the peak hours and a full detailed results from the model and its inputs can be found in **Appendix A**.

2017 Observed	AM			PM		
	RFC	Queue (PCU)	Delay (s)	RFC	Queue (PCU)	Delay (s)
Bassingbourn Road	0.10	0	2.43	0.30	0	3.29
Thremhall Avenue	0.30	0	2.14	0.48	1	3.35
A120E	0.31	1	2.03	0.26	0	2.10
A120W	0.32	1	2.18	0.32	1	1.96

Table 1.2 – 2017 Junction Performance

Recorded data shows that the Bassingbourn roundabout is typically free flowing in either peak hours (AM and PM) and therefore, it was decided to use this base model in future analysis.

The recognised capacity factor at a roundabout is the RFC (or Ratio of Flow to Capacity) of an approach. Where this RFC is below a 0.85 threshold queues and delay are considered insignificant and where values are above 0.85 but below 1.00, the approach is operating close to capacity but within absolute capacity and cognisance of queuing must be made. Where RFC values are in excess of 1.00 the approach is deemed to be over capacity and the junction has failed.

It can be seen from the results that all arms of the Bassingbourn Roundabout operate significantly below this 0.85 RFC threshold, where the maximum RFC is 0.32 on the A120 Western approach (towards Standsted) during the AM peak and correspondingly on the Thremhall Avenue approach (from Stansted) during the PM peak.

Assessment Years/ Growth

It is envisaged that the residential development will be occupied by 2022 so traffic was factored to this date for initial assessment using National Traffic Model (NTM) adjusted predicted government economic growth figures from the Tempro database (V7.2) for an average of the Census Super Output Middle Layers Uttlesford 005 and 006. The resultant 2017 to 2022 TEMPRO growth factors are shown in the previous **Table 1.1** and TEMPRO growth factors for the recommended analysis year (2033) are summarised in **Table 1.3**.

2017-2033	
AM	1.1604
PM	1.1628

Table 1.3 – 2017 – 2033 Tempro derived Growth Factors

Committed Developments/ Future Base Traffic Flows

The December 2017 Transport Assessment contained a comprehensive list of committed developments which were added to both the 2022 and 2033 growthed traffic flows to give the resultant base networks shown in **Figures 1.3** and **1.4**. Whilst there will be an element of double counting as the previous Tempro growth factors included the predicted economic growth bespoke to the area, in the interests of robustness it was decided to include the growth due to committed developments also.

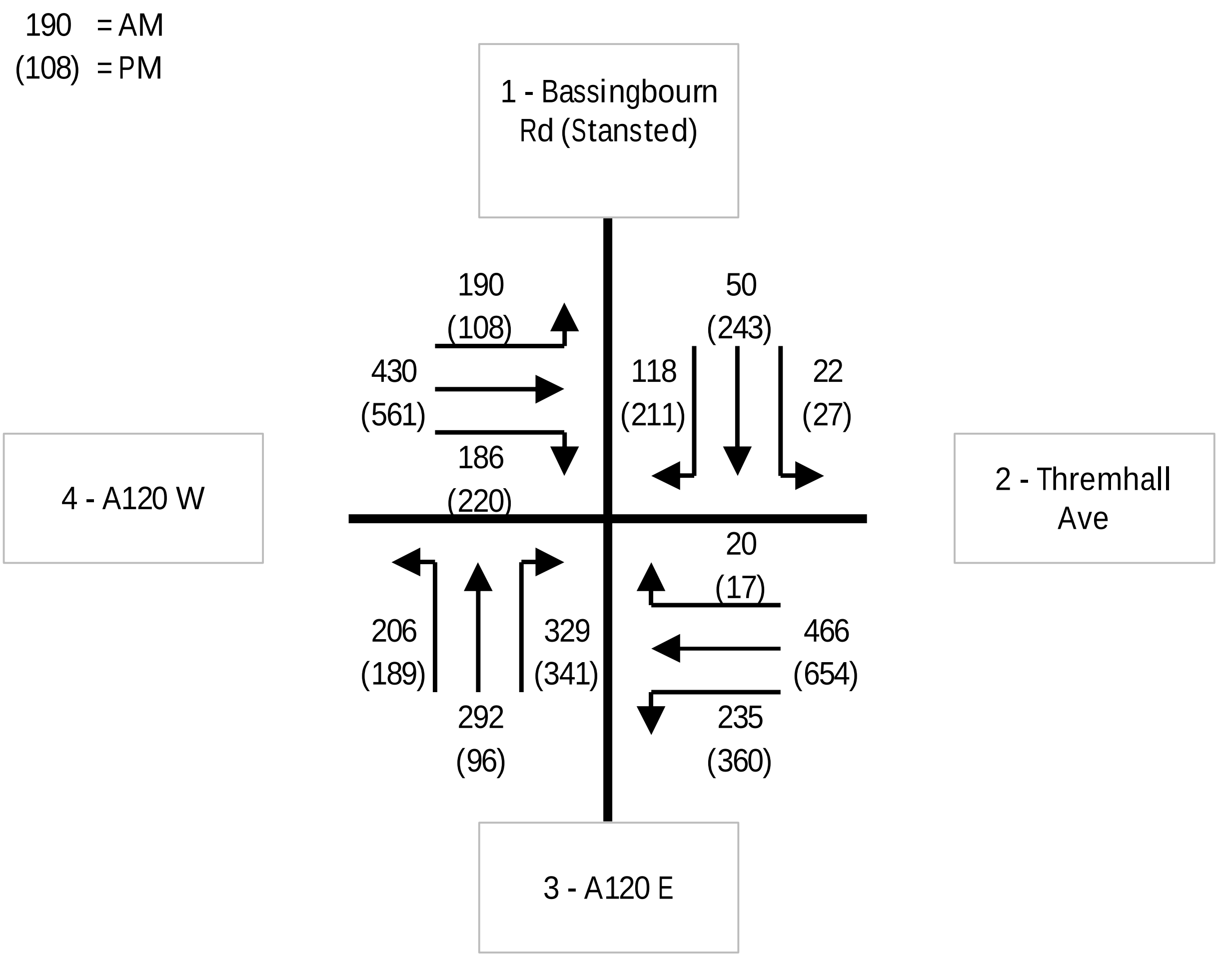


Figure 1.3 – 2022 Base Traffic Flows (PCUs)

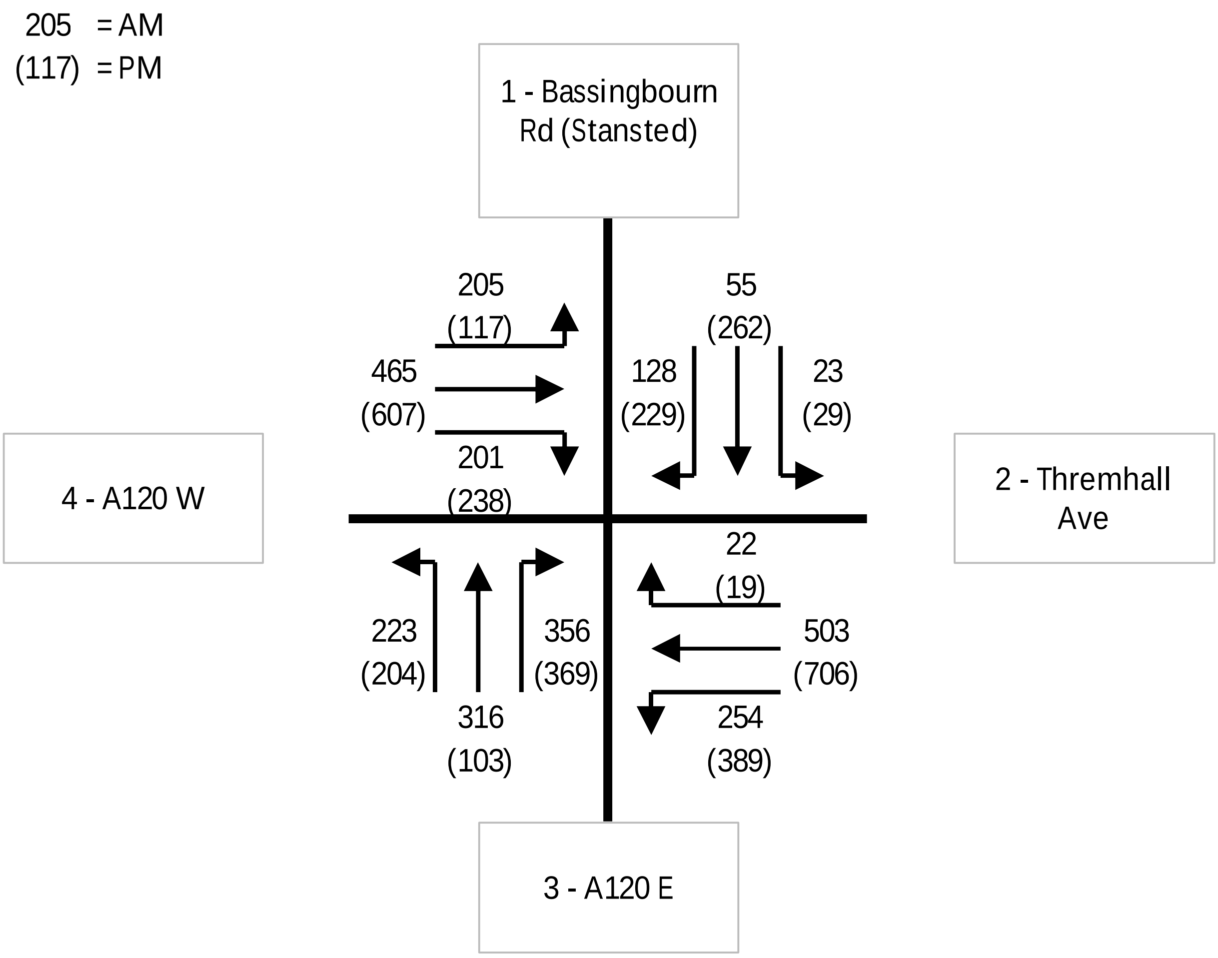


Figure 1.4 – 2033 Base Traffic Flows (PCUs)

Development Flows

The December 2017 Transport Assessment (TA) presented a detailed break down of trip generation, modal split, distribution and assignment which resulted in the following number of car trips (**Figure 1.5**) through the Bassingbourn Roundabout.

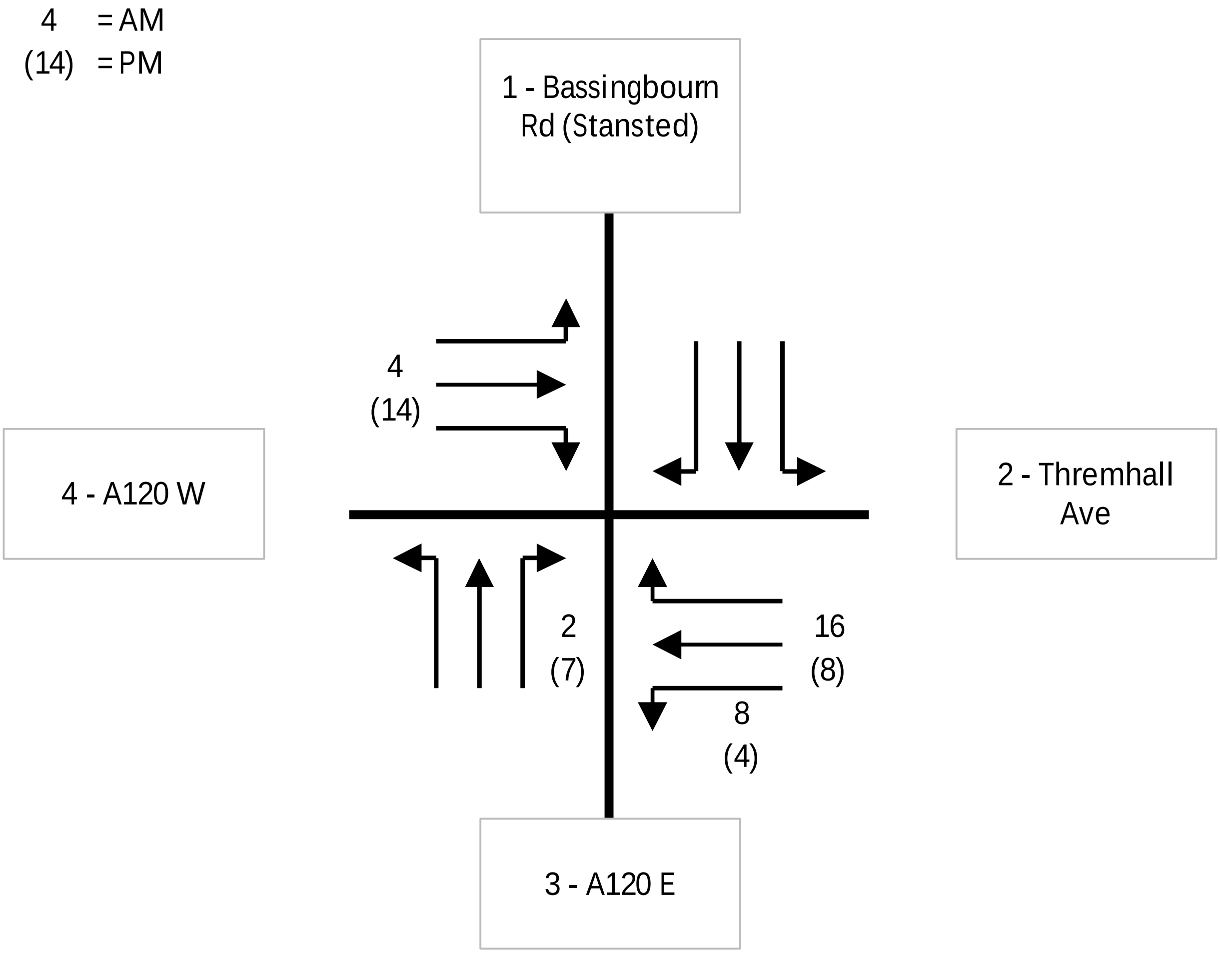


Figure 1.5 – Development Car Trips through the Bassingbourn Roundabout

Junction Analysis

To assess the impact of the development upon the 2022 base and 2033 base networks at the Bassingbourn Roundabout a Junctions 9 model (using the ARCADY module) was built. The results of the 2022 base model are summarised in **Table 1.4** and full outputs can be found in **Appendix A**.

2022 Base (Growth + Committed)	AM			PM		
	RFC	Queue (PCU)	Delay (s)	RFC	Queue (PCU)	Delay (s)
Bassingbourn Road	0.10	0	2.57	0.34	1	3.65
Thremhall Avenue	0.32	1	2.25	0.54	1	3.84
A120E	0.34	1	2.17	0.29	0	2.27
A120W	0.35	1	2.34	0.35	1	2.08

Table 1.4 – 2022 Base Junctions 9 Model

It can be seen from **Table 1.4** that even when allowing for committed growth in addition to predicted economic growth that the Bassingbourn Roundabout still operates within capacity and there is only slight compounding of the RFC's. The RFC on the A120 Western approach rises slightly to 0.35 (from 0.32) during the AM peak and the RFC on the Thremhall Avenue approach rises to 0.54 (from 0.48) in the PM peak.

The effect of the predicted development traffic was subsequently added to the 2022 base to consider the impact of a fully occupied development. **Table 1.5** summarises the effect of this additional traffic during the peak hours and full model outputs can be found in **Appendix A**.

2022 Total	AM			PM		
	RFC	Queue (PCU)	Delay (s)	RFC	Queue (PCU)	Delay (s)
Bassingbourn Road	0.12	0	2.58	0.35	1	3.73
Thremhall Avenue	0.33	1	2.29	0.54	1	3.90
A120E	0.34	1	2.20	0.30	0	2.29
A120W	0.36	1	2.35	0.36	1	2.11

Table 1.5 – 2022 Total Junctions 9 Model

It can be seen that the traffic flows from the proposed residential development have very little effect upon the approaches to the junction and RFCs remain significantly below the recognised threshold to take cognisance of queuing and within capacity. The maximum RFC during the AM peak on the A120 Western approach rises by just 0.01 and the maximum PM RFC on the Thremhall Avenue approach rises by less than 0.01 and isn't even recorded.

Whilst it is clear that in line with **Paragraph 27** of the DfT 02/2013 Circular that the overall forecast demand at the time of opening of the development can be accommodated by the existing SRN infrastructure, in line with the 2015 HE Guide, the draft Local Plan for Uttlesford and the presented growth/flows a subsequent review was undertaken for 2033. The results of the 2033 analysis for the base scenario (TEMPRO growth + Committed Development Traffic) are summarised in **Table 1.6** and detailed results are contained in **Appendix A**.

2033 Base (Growth + Committed)	AM			PM		
	RFC	Queue (PCU)	Delay (s)	RFC	Queue (PCU)	Delay (s)
Bassingbourn Road	0.14	0	2.74	0.40	1	4.20
Thremhall Avenue	0.35	1	2.39	0.60	2	4.56
A120E	0.37	1	2.35	0.33	1	2.48
A120W	0.39	1	2.56	0.39	1	2.24

Table 1.6 – 2033 Base Junctions 9 Model

Table 1.6 demonstrates that the Bassingbourn Roundabout will continue to operate within capacity during the peak 15 minutes of the peak hours in 2033 when allowing for both the government predicted economic growth (TEMPRO) and the identified committed developments. The RFC on the A120 Western approach during the AM rises to just 0.39 and correspondingly the RFC on the Thremhall Avenue approach rises to just 0.60. Both figures are substantially below the recognised capacity threshold of a 0.85 after which cognisance of queuing is required.

In line with the previous 2022 analysis the addition of the development traffic to the 2033 base was also considered. The results of the 2033 Total scenario are summarised for the peak hours in **Table 1.7** and detailed inputs and outputs of the analysis can be found in **Appendix A**.

2033 Total	AM			PM		
	RFC	Queue (PCU)	Delay (s)	RFC	Queue (PCU)	Delay (s)
Bassingbourn Road	0.14	0	2.75	0.40	1	4.30
Thremhall Avenue	0.36	1	2.43	0.61	2	4.64
A120E	0.38	1	2.39	0.34	1	2.51
A120W	0.39	1	2.57	0.40	1	2.27

Table 1.7 – 2033 Total Junctions 9 Model

It can be seen from **Table 1.7** that the relatively small impact of the development continues to be accommodated with the existing capacity of the SRN at the Bassingbourn Roundabout. The RFC on the A120 Western approach during the AM peak rises by less than 0.01 and the corresponding RFC on the Thremhall Avenue approach during the PM peak increases by just 0.01.

SRN Modelling Conclusion

It is concluded with regards to the modelling of the SRN, particularly the Bassingbourn Roundabout, that the existing road network can successfully accommodate development traffic within the existing capacity of the SRN and in line with the policies of Circular 02/2013 and the 2015 HE Guide and therefore the HE should not object to the development proposals.

Furthermore, accompanying the Transport Assessment is a comprehensive Framework for a Residential Travel Plan which once developed will mitigate the negligible impact of the development yet further. Mitigation through the travel plan process also concurs with Circular 02/2013 and the 2015 HE Guide.

7 Trip Generation

7.1 WSP has used vehicle trip rates from a previous application in 2013 to predict the number of vehicle trips generated by the proposed development. AECOM reviewed the trip rates in TN01 and considered that they were reasonable, therefore this conclusion remains.

WSP welcome that AECOM consider the utilised trip rates as reasonable.

7.2 WSP state that the majority of trips associated with the new primary school will remain internal to the development site. AECOM consider that although it is likely that a significant proportion of pupil trips will likely be internal to the site, there may be some trips that are external to the site. However, AECOM consider that the chances of any external pupil trips making use of the SRN are very small and therefore from HE perspective the assumption that all pupil trips remaining internal to the site is considered acceptable.

WSP acknowledge that there is a chance, however small that there may be an element of external school trips that do not travel sustainably, however WSP also welcome that AECOM do not consider these trips significant in terms of the SRN and the assumption presented in the TA as to internalisation of school trips is acceptable.

7.3 AECOM note that there is no discussion of staff trips associated with the proposed school. AECOM consider that all of these trips are unlikely to be internal to site and that staff would likely travel from further afield, with a proportion making use of the SRN. It is therefore recommended that staff trips are subject to typical methods of trip generation, distribution and assignment to the network to determine what their impact could be on the SRN. Furthermore, this should include the staff associated with the early learning years and childcare centres. It is recommended that this is fully outlined within a revised TA.

As discussed in **Section 2.2**, WSP agree with AECOM that there may be a small element of external trips by staff not from the local area, however the majority of trips will be local and with dilution of the remaining through distribution and assignment the impact upon the SRN will be negligible and would not warrant altering the agreed trip rates for the development or the production of a revised TA. WSP therefore, consider that AECOM should come to the same reasonable conclusion that they made to as per pupil trips.

8 Trip Distribution

8.1 WSP has utilised 2011 Census Journey to Work (JTW) data for the Uttlesford 005 Middle Super Output Area (MSOA) (E02004595) to predict vehicle trip distribution.

8.2 Similar to the scoping stage, WSP have conducted a more detailed local distribution analysis covering the rural areas around Elsenham, using Output Areas, the smallest geographical area from the 2011 Census. The workplace population for the Output Areas has been used to produce a distribution for this area, excluding Elsenham itself, as it has been assumed that journeys to work within Elsenham from the proposed development would be made by foot and bicycle. AECOM considers this approach reasonable.

8.3 *AECOM undertook their own vehicle trip distribution using 2011 Census JTW data for the same MSOA – Uttlesford 005 (E020045959). As highlighted in TN01, AECOM consider that the distribution presented may slightly underestimate the number of longer distance strategic trips that could be made by residents of the proposed development site and considers therefore that the number of trips predicted to route via the SRN could be underestimated by WSP. The trip distribution percentage difference between AECOM and WSP can be found in Table 3 below:*

Table 3: Trip Distribution Percentage Comparison

Junction	WSP	AECOM
M11 Junction 8 Roundabout	5%	3%
M11 J8 sliproads (M11 J8 combined)	19% (24%)	29% (32%)
A120 Priory Wood Roundabout	14%	19%
A120 Bassingbourn Roundabout	17%	23%

WSP welcomes that AECOM considers the approach to Trip Distribution within the TA is reasonable and acknowledge that whilst an individual may come to slightly different answer the absolute difference at the Bassingbourn Roundabout is just 8 outbound trips during the AM peak and 4 outbound trips during the PM peak and correspondingly 2 inbound trips during the AM peak and 7 trips inbound during the PM peak. It is not considered that this small number of trips will make a significant difference to the conclusion of our analysis presented previously:

'The existing road network can successfully accommodate development traffic within the existing capacity of the SRN and in line with the policies of Circular 02/2013 and the 2015 HE Guide and therefore, HE should not object to the development proposals'; and the

'comprehensive Framework for a Residential Travel Plan which once developed will mitigate the negligible impact of the development yet further. Mitigation through the travel plan process also concurs with Circular 02/2013 and the 2015 HE Guide'.

9 Trip Assignment

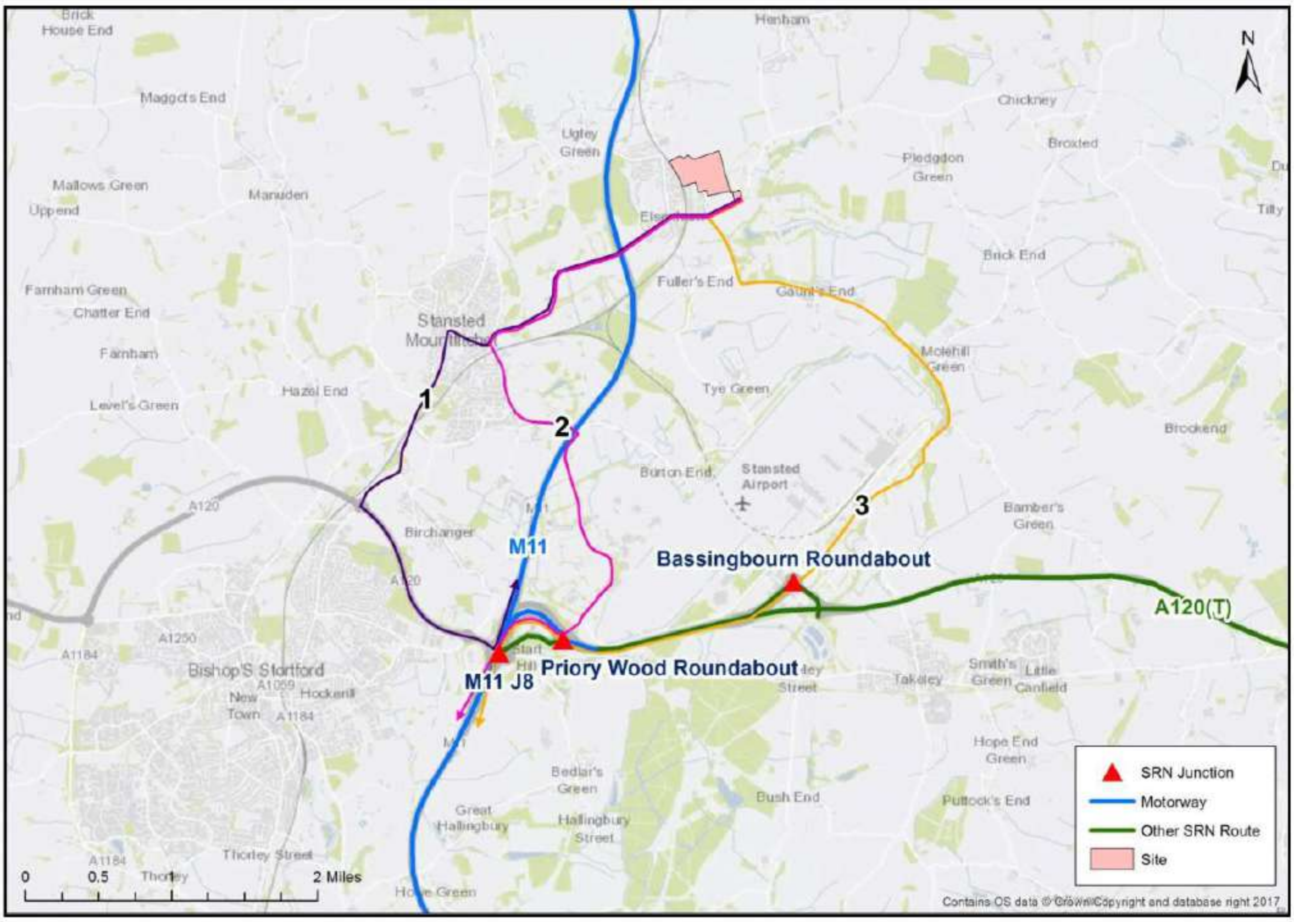
9.1 *WSP has split the trip assignment into two categories. Strategic destinations are analysed at MSOA level and local destinations at Output Area Level.*

9.2 *Sixteen routes have been identified for local trips. The only local route that makes use of the SRN is East Essex, via Thremhall Avenue, Bassingbourn Roundabout and the A120 eastbound. AECOM considers this a reasonable assignment path.*

9.3 *Within TN01, AECOM contested that the assigned strategic routes to M11 J8 may not be representative of the typical routes to the SRN and were concerned that the impact at Bassenbourn Roundabout and M11 Junction 8 was being underestimated.*

9.4 *A diagram of M11 strategic assignment routes identified by WSP and AECOM is shown below. Routes 2 and 3 were identified by WSP, while Route 1 has only been identified by AECOM. It should be noted that the route numbers below are not consistent with those identified by WSP; they have been allocated independently by AECOM for their analysis purposes.*

Figure 2: Possible routes of vehicle trips assigning from the proposed development to the M11



9.5 *WSP's route assignment uses a 50/50 split between Priory Wood Roundabout and Bassingbourn Roundabout (Routes 2 and 3), regardless of direction on the M11.*

9.6 *AECOM considered that the M11 and East routes via Hall Road / Bassingbourn Roundabout are reasonable assignment paths.*

9.7 *As outlined within TN01, AECOM's route assignment uses Route 1 for M11 northbound trips and Route 3 for M11 southbound trips. These routes were based off those suggested by Google Maps journey planning.*

9.8 *Following a recommendation by AECOM within their Scoping Note to reconsider the routing based on the direction of the vehicles, WSP have provided the following reasons to maintain their previous assignment of routes 2 and 3 (illustrated in Figure 2 above):*

- *Hall Road - Thremhall Avenue - M11 avoids routing through Stansted Mountfitchet and also provides direct access to the south facing free flow M11 on-off slips at Junction 8;*
- *B1051 - Church Road - Bury Lodge Lane - M11 also provides direct access to the free flow M11 south facing slips at Junction 8 of the M11, although routes via Grove Hill and the Lower Street / Church Road / Chapel Hill mini-roundabout in Stansted Mountfitchet;*
- *The Trafficmaster Data shows that the AM peak period southbound journey times between the Hall Road and Bury Lodge Lane routes are similar (13 mins 15 seconds and 12 mins 34 seconds respectively); and*
- *The Trafficmaster Data shows that PM peak period northbound journey times between the Hall Road and Bury Lodge Lane routes are similar (12 mins 23 seconds and 11 mins 56 seconds).*

9.9 *AECOM have reconsidered WSP's strategic assignment network flows and consider that a 50/50 split for trips to/from the M11 between Hall Road – Thremhall Avenue and B1051 – Church Road is reasonable. A comparison between the vehicle trip impacts on the SRN predicted by WSP and AECOM, based on the different distribution assumptions, is shown in the table below.*

Table 4: Comparison of impact of proposed development at SRN junctions

Junction	WSP		AECOM	
	AM Trips	PM Trips	AM Trips	PM Trips
M11 Junction 8 Roundabout	9	9	6	6
(including through slip roads)	42	45	56	61
A120 Priory Wood Roundabout	25	26	34	37
A120 Bassingbourn Roundabout	30	32	40	43

9.10 *Table 4 indicates that AECOM and WSP's development trips predicted to route through the M11 J8 roundabout are similar. AECOM consider that the development trips anticipated to route through the M11 J8 roundabout will unlikely have a material impact on the operation of the roundabout itself.*

9.11 *Whilst considered in isolation the number of additional trips at M11 Junction 8 may not warrant further assessment, it is likely that these additional trips will contribute towards a cumulative impact arising from multiple developments coming forward in the area. It is unclear whether full funding has been obtained to support the National Productivity Investment Fund (NPIF) scheme.* ***If full funding has not been obtained, it is recommended that consideration is given to requesting a contribution to the scheme from the Elsenham development proposal****.*

9.12 *It was previously recommended within TN01, that the total number of vehicles predicted by AECOM to impact on the A120 Bassingbourn Roundabout warrants a junction capacity assessment and it was recommended that this is included within the forthcoming TA. Upon review, AECOM consider that the amount of trips routing through Bassingbourn junction are still being underestimated. A junction capacity for the Bassingbourn Roundabout has not been included and therefore AECOM are still concerned that the impact of the development on this SRN junction is not understood.*

WSP welcomes that AECOM considers the trip assignment presented within the TA is reasonable and that AECOM recognise that any difference in the calculation of trip assignment at M11 Junction 8 is negligible and whilst we consider that the consideration as to development contribution should similarly be dismissed in light of the Travel Plan that accompanied the TA and HE guidance on mitigation through the travel plan process we will pass on the advice to the client and this should matter not delay the planning process.

As acknowledged that whilst an individual may come to slightly different answer the absolute difference at the Bassingbourn Roundabout is just 8 outbound trips during the AM peak and 4 outbound trips during the PM peak and correspondingly 2 inbound trips during the AM peak and 7 trips inbound during the PM peak. It is not considered that this small number of trips will make a significant difference to the conclusion of our analysis presented previously:

'The existing road network can successfully accommodate development traffic within the existing capacity of the SRN and in line with the policies of Circular 02/2013 and the 2015 HE Guide and therefore, HE should not object to the development proposals'; and the

'comprehensive Framework for a Residential Travel Plan which once developed will mitigate the negligible impact of the development yet further. Mitigation through the travel plan process also concurs with Circular 02/2013 and the 2015 HE Guide'.

10 Highway Impact and Potential Mitigation Measures

10.1 As hig*hlighted in Table 4, there is expected to be a material increase in vehicles predicted to route through the A120 Bassingbourn Roundabout. WSP have not currently undertaken junction capacity assessments of SRN junctions and have not identified mitigation measures for these junctions.*

10.2 WSP state that two-way traffic flows at the A120 Bassingbourn Roundabout are predicted to increase by a maximum of 2% in the AM and PM peak hours. WSP state that the proposed development will have a minimal impact on the operation of this junction and therefore neither a detailed capacity assessment nor mitigation measures are required.

10.3 AECOM consider that a percentage increase comparison of development trips against total trips is not an indication that the increase in trips could have on the junction operation. AECOM consider that over 40 development trips would route through the A120 Bassingbourn Roundabout in both the AM and PM peaks. AECOM consider that this increase in trips could cause a material impact on the junction. ***It is therefore recommended that a junction capacity assessment is undertaken to understand the impact of the development on the operation of the roundabout. The assessments undertaken should assess the operation of the roundabout, without and with development trips, for both the 2022 and 2033 assessment years identified. Consideration may need to be given to additional committed developments above those already included within the TA that would have an influence upon the operation of the roundabout****. If the impact upon the operation of the junction from the proposed development is considered to be severe then measures may be required to mitigate that impact. It should be noted that this development site is not currently included in the Local Plan and therefore will not be included in any cumulative assessment of the A120 Bassingbourn Roundabout that could be undertaken to support the Plan.*

WSP acknowledge that AECOM do not consider a standard percentage impact, albeit and extremely low 2%, is an indication as to effect of development trips upon the network and therefore, WSP have carried out a traffic assessment of the Bassingbourn Roundabout, as presented previously in **Section 6** which confirmed that:

'the existing road network can successfully accommodate development traffic within the existing capacity of the SRN and in line with the policies of Circular 02/2013 and the 2015 HE Guide and therefore, HE should not object to the development proposals'.

Furthermore, accompanying the Transport Assessment is a comprehensive Framework for a Residential Travel Plan which once developed will mitigate the negligible impact of the development yet further. Mitigation through the travel plan process also concurs with Circular 02/2013 and the 2015 HE Guide.

11 Conclusion

This Technical Note 04 has been produced in response to the review of Technical Note 02 produced by AECOM (on behalf of Highways England) with regards to the proposed development site on Land to the East of Elsenham, a 4.2 miles (6.8 km or 8 minutes) drive north of the SRN at the Bassingbourn Roundabout or a 5.3 miles (8.5 km or 15 minutes) drive north of the SRN via Stansted Mountfitchet and M11 Junction 8.

The technical note presents primarily (**Section 6**) traffic analysis of the Bassingbourn Roundabout carried out by WSP and determined that:

'the existing road network can successfully accommodate development traffic within the existing capacity of the SRN and in line with the policies of Circular 02/2013 and the 2015 HE Guide'; and the

'comprehensive Framework for a Residential Travel Plan which once developed will mitigate the negligible impact of the development yet further. Mitigation through the travel plan process also concurs with Circular 02/2013 and the 2015 HE Guide'.

Therefore, it is considered that HE should not object to the development proposals and concur with their own policy to only refuse a development on transport grounds where the 'residual cumulative impacts of development are severe'. This technical note clearly demonstrates the impacts are negligible. However, we are happy to meet HE and AECOM again to discuss the contents of this note if necessary, to reach agreement on the development's impact on the SRN.

APPENDIX A – Junctions 9 Inputs and Outputs reports

Junctions 9

ARCADY 9 - Roundabout Module

Version: 9.0.2.5947

For sales and distribution information, program advice and maintenance, contact TRL:
+44 (0)1344 770558 software@trl.co.uk [redacted]

Filename: Bassingbourne Rbt AM2.j9
Path: [redacted]
Report generation date: 18/07/2018 11:56:36

Summary of junction performance

	AM			
	Queue (PCU)	Delay (s)	RFC	LOS
	2017			
Arm 2	0.4	2.14	0.30	A
Arm 3	0.5	2.03	0.31	A
Arm 4	0.5	2.18	0.32	A
Arm 1	0.1	2.43	0.10	A
	2022 Base			
Arm 2	0.5	2.25	0.32	A
Arm 3	0.5	2.17	0.34	A
Arm 4	0.6	2.34	0.35	A
Arm 1	0.1	2.57	0.12	A
	2022 Total			
Arm 2	0.5	2.29	0.33	A
Arm 3	0.6	2.20	0.34	A
Arm 4	0.6	2.35	0.36	A
Arm 1	0.1	2.58	0.12	A
	2033 Base			
Arm 2	0.6	2.39	0.35	A
Arm 3	0.6	2.35	0.37	A
Arm 4	0.7	2.56	0.39	A
Arm 1	0.2	2.74	0.14	A
	2033 Total			
Arm 2	0.6	2.43	0.36	A
Arm 3	0.7	2.39	0.38	A
Arm 4	0.7	2.57	0.39	A
Arm 1	0.2	2.75	0.14	A

There are warnings associated with one or more model runs - see the 'Data Errors and Warnings' tables for each Analysis or Demand Set.

Values shown are the highest values encountered over all time segments. Delay is the maximum value of average delay per arriving vehicle.

File summary

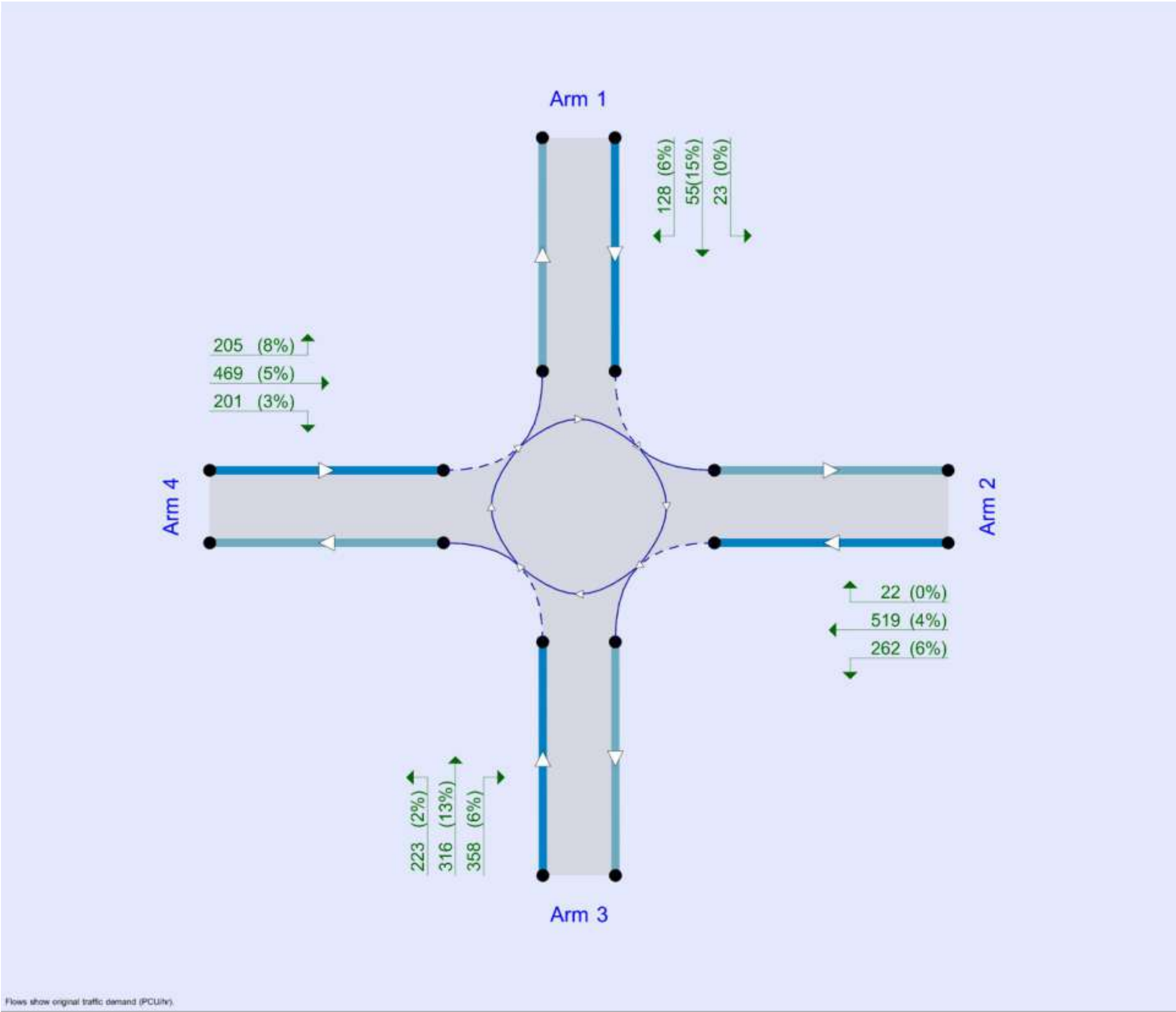
File Description

Title	Bassingourne Roundabout
Location	Stansted Airport
Site number	
Date	10/07/2018
Version	
Status	(new file)
Identifier	Elsenham
Client	

Jobnumber	11500582
Enumerator	CORP\UKAJM005
Description	

Units

Distance units	Speed units	Traffic units input	Traffic units results	Flow units	Average delay units	Total delay units	Rate of delay units
m	kph	PCU	PCU	perHour	s	-Min	perMin



The junction diagram reflects the last run of Junctions.

Analysis Options

Calculate Queue Percentiles	Calculate residual capacity	RFC Threshold	Average Delay threshold (s)	Queue threshold (PCU)
		0.85	36.00	20.00

Demand Set Summary

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D1	2017	AM	ONE HOUR	07:45	09:15	15
D2	2022 Base	AM	ONE HOUR	07:45	09:15	15
D3	2022 Total	AM	ONE HOUR	07:45	09:15	15
D4	2033 Base	AM	ONE HOUR	07:45	09:15	15
D5	2033 Total	AM	ONE HOUR	07:45	09:15	15

Analysis Set Details

ID	Network flow scaling factor (%)
A1	100.000

[redacted]

2017, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	Arm 1 - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.

Junction Network

Junctions

Junction	Name	Junction Type	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Large Roundabout	2, 3, 4, 1	2.14	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Name	Description
2	Themhall Avenue	
3	A120E	
4	A120W	
1	Bassingbourne Rd	

Roundabout Geometry

Arm	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit only
2	7.50	8.14	0.1	43.0	120.0	31.0	
3	7.30	11.12	11.3	50.0	120.0	34.0	
4	7.30	11.12	11.3	50.0	120.0	34.0	
1	3.65	8.15	37.5	50.0	120.0	39.0	

Large Roundabout Data

Arm	Circulating flow (PCU/hr)	Entry-to-exit separation (m)
2	644	88.00
3	591	40.00
4	643	101.00
1	847	48.00

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Final slope	Final intercept (PCU/hr)
2	1.020	2864
3	1.155	3459
4	1.143	3316
1	0.907	2656

The slope and intercept shown above include any corrections and adjustments.

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D1	2017	AM	ONE HOUR	07:45	09:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
2		✓	669	100.000
3		✓	767	100.000
4		✓	751	100.000
1		✓	169	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		2	**3**	**4**	**1**
From	**2**	0	218	432	19
	3	303	0	192	272
	4	401	173	0	177
	1	12	47	110	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		2	**3**	**4**	**1**
From	**2**	0	6	4	0
	3	6	0	2	13
	4	5	3	0	8
	1	0	15	6	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max delay (s)	Max Queue (PCU)	Max LOS
2	0.30	2.14	0.4	A
3	0.31	2.03	0.5	A
4	0.32	2.18	0.5	A
1	0.10	2.43	0.1	A

Main Results for each time segment

07:45 - 08:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
2	504	248	2611	0.193	503	0.2	1.787	A
3	577	421	2973	0.194	576	0.3	1.614	A
4	565	446	2805	0.202	564	0.3	1.691	A
1	127	659	2059	0.062	127	0.1	2.008	A

08:00 - 08:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
2	601	297	2562	0.235	601	0.3	1.922	A
3	690	504	2877	0.240	689	0.3	1.767	A
4	675	534	2706	0.250	675	0.3	1.866	A
1	152	788	1942	0.078	152	0.1	2.167	A

08:15 - 08:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
2	737	363	2494	0.295	736	0.4	2.145	A
3	844	617	2747	0.307	844	0.5	2.033	A
4	827	654	2569	0.322	826	0.5	2.176	A
1	186	965	1781	0.104	186	0.1	2.431	A

08:30 - 08:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
2	737	363	2493	0.295	737	0.4	2.145	A
3	844	618	2746	0.308	844	0.5	2.033	A
4	827	654	2568	0.322	827	0.5	2.177	A
1	186	966	1781	0.104	186	0.1	2.432	A

08:45 - 09:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
2	601	297	2561	0.235	602	0.3	1.925	A
3	690	505	2876	0.240	690	0.3	1.768	A
4	675	534	2705	0.250	676	0.4	1.871	A
1	152	789	1941	0.078	152	0.1	2.168	A

09:00 - 09:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
2	504	249	2611	0.193	504	0.3	1.788	A
3	577	423	2971	0.194	578	0.3	1.618	A
4	565	447	2804	0.202	566	0.3	1.693	A
1	127	661	2057	0.062	127	0.1	2.009	A

2022 Base, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	Arm 1 - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.

Junction Network

Junctions

Junction	Name	Junction Type	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Large Roundabout	2, 3, 4, 1	2.28	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

[same as above]

Roundabout Geometry

[same as above]

Large Roundabout Data

Arm	Circulating flow (PCU/hr)	Entry-to-exit separation (m)
2	644	88.00
3	591	40.00
4	643	101.00
1	847	48.00

Slope / Intercept / Capacity

[same as above]

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D2	2022 Base	AM	ONE HOUR	07:45	09:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
2		✓	721	100.000
3		✓	827	100.000
4		✓	806	100.000
1		✓	190	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		2	3	4	1
From	2	0	235	466	20
	3	329	0	206	292

	4	430	186	0	190
	1	22	50	118	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		2	**3**	**4**	**1**
From	**2**	0	6	4	0
	3	6	0	2	13
	4	5	3	0	8
	1	0	15	6	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max delay (s)	Max Queue (PCU)	Max LOS
2	0.32	2.25	0.5	A
3	0.34	2.17	0.5	A
4	0.35	2.34	0.6	A
1	0.12	2.57	0.1	A

Main Results for each time segment

07:45 - 08:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
2	543	266	2593	0.209	542	0.3	1.838	A
3	623	454	2935	0.212	621	0.3	1.671	A
4	607	482	2765	0.219	606	0.3	1.755	A
1	143	710	2012	0.071	143	0.1	2.066	A

08:00 - 08:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
2	648	318	2540	0.255	648	0.4	1.992	A
3	743	543	2833	0.262	743	0.4	1.850	A
4	725	576	2657	0.273	724	0.4	1.961	A
1	171	849	1886	0.091	171	0.1	2.252	A

08:15 - 08:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
2	794	389	2467	0.322	793	0.5	2.252	A
3	911	665	2692	0.338	910	0.5	2.171	A
4	887	705	2510	0.354	887	0.6	2.335	A
1	209	1040	1714	0.122	209	0.1	2.568	A

08:30 - 08:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
2	794	390	2467	0.322	794	0.5	2.253	A
3	911	665	2691	0.338	911	0.5	2.171	A
4	887	706	2509	0.354	887	0.6	2.337	A
1	209	1040	1713	0.122	209	0.1	2.569	A

08:45 - 09:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
2	648	319	2539	0.255	649	0.4	1.996	A
3	743	543	2832	0.263	744	0.4	1.855	A
4	725	577	2656	0.273	725	0.4	1.965	A
1	171	850	1885	0.091	171	0.1	2.255	A

09:00 - 09:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
2	543	267	2592	0.209	543	0.3	1.842	A
3	623	455	2934	0.212	623	0.3	1.675	A
4	607	483	2764	0.220	607	0.3	1.760	A
1	143	712	2011	0.071	143	0.1	2.070	A

2022 Total, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	Arm 1 - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.

Junction Network

Junctions

Junction	Name	Junction Type	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Large Roundabout	2, 3, 4, 1	2.30	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

[same as above]

Roundabout Geometry

[same as above]

Large Roundabout Data

Arm	Circulating flow (PCU/hr)	Entry-to-exit separation (m)
2	644	88.00
3	591	40.00
4	643	101.00
1	847	48.00

Slope / Intercept / Capacity

[same as above]

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D3	2022 Total	AM	ONE HOUR	07:45	09:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
2		✓	745	100.000
3		✓	829	100.000
4		✓	810	100.000
1		✓	190	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		2	3	4	1
From	2	0	243	482	20
	3	331	0	206	292

	4	434	186	0	190
	1	22	50	118	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		2	**3**	**4**	**1**
From	**2**	0	6	4	0
	3	6	0	2	13
	4	5	3	0	8
	1	0	15	6	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max delay (s)	Max Queue (PCU)	Max LOS
2	0.33	2.29	0.5	A
3	0.34	2.20	0.6	A
4	0.36	2.35	0.6	A
1	0.12	2.58	0.1	A

Main Results for each time segment

07:45 - 08:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
2	561	266	2593	0.216	560	0.3	1.854	A
3	624	466	2921	0.214	623	0.3	1.682	A
4	610	483	2763	0.221	609	0.3	1.759	A
1	143	715	2008	0.071	143	0.1	2.071	A

08:00 - 08:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
2	670	318	2540	0.264	669	0.4	2.015	A
3	745	557	2816	0.265	745	0.4	1.866	A
4	728	578	2655	0.274	728	0.4	1.967	A
1	171	854	1882	0.091	171	0.1	2.258	A

08:15 - 08:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
2	820	389	2467	0.333	820	0.5	2.289	A
3	913	682	2672	0.342	912	0.6	2.198	A
4	892	707	2507	0.356	891	0.6	2.345	A
1	209	1046	1708	0.123	209	0.1	2.578	A

08:30 - 08:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
2	820	390	2467	0.333	820	0.5	2.289	A
3	913	683	2671	0.342	913	0.6	2.199	A
4	892	708	2506	0.356	892	0.6	2.347	A
1	209	1047	1707	0.123	209	0.1	2.579	A

08:45 - 09:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
2	670	319	2539	0.264	670	0.4	2.017	A
3	745	558	2815	0.265	746	0.4	1.871	A
4	728	579	2654	0.274	729	0.4	1.969	A
1	171	856	1880	0.091	171	0.1	2.260	A

09:00 - 09:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
2	561	267	2592	0.216	561	0.3	1.855	A
3	624	467	2920	0.214	624	0.3	1.687	A
4	610	484	2762	0.221	610	0.3	1.761	A
1	143	716	2007	0.071	143	0.1	2.073	A

2033 Base, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	Arm 1 - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.

Junction Network

Junctions

Junction	Name	Junction Type	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Large Roundabout	2, 3, 4, 1	2.46	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

[same as above]

Roundabout Geometry

[same as above]

Large Roundabout Data

Arm	Circulating flow (PCU/hr)	Entry-to-exit separation (m)
2	644	88.00
3	591	40.00
4	643	101.00
1	847	48.00

Slope / Intercept / Capacity

[same as above]

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D4	2033 Base	AM	ONE HOUR	07:45	09:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
2		✓	779	100.000
3		✓	895	100.000
4		✓	871	100.000
1		✓	206	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		2	3	4	1
From	2	0	254	503	22
	3	356	0	223	316

	4	465	201	0	205
	1	23	55	128	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		2	**3**	**4**	**1**
From	**2**	0	6	4	0
	3	6	0	2	13
	4	5	3	0	8
	1	0	15	6	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max delay (s)	Max Queue (PCU)	Max LOS
2	0.35	2.39	0.6	A
3	0.37	2.35	0.6	A
4	0.39	2.56	0.7	A
1	0.14	2.74	0.2	A

Main Results for each time segment

07:45 - 08:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
2	586	288	2570	0.228	585	0.3	1.899	A
3	674	491	2893	0.233	673	0.3	1.742	A
4	656	521	2720	0.241	654	0.3	1.836	A
1	155	768	1960	0.079	155	0.1	2.141	A

08:00 - 08:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
2	700	345	2512	0.279	700	0.4	2.080	A
3	805	587	2782	0.289	804	0.4	1.956	A
4	783	624	2603	0.301	783	0.5	2.083	A
1	185	918	1824	0.102	185	0.1	2.359	A

08:15 - 08:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
2	858	422	2433	0.352	857	0.6	2.390	A
3	985	718	2630	0.375	985	0.6	2.350	A
4	959	763	2443	0.393	958	0.7	2.552	A
1	227	1124	1637	0.139	227	0.2	2.741	A

08:30 - 08:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
2	858	423	2433	0.353	858	0.6	2.392	A
3	985	719	2629	0.375	985	0.6	2.352	A
4	959	764	2442	0.393	959	0.7	2.555	A
1	227	1125	1636	0.139	227	0.2	2.743	A

08:45 - 09:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
2	700	346	2512	0.279	701	0.4	2.084	A
3	805	588	2781	0.289	805	0.4	1.958	A
4	783	625	2602	0.301	784	0.5	2.088	A
1	185	920	1822	0.102	185	0.1	2.363	A

[redacted]

09:00 - 09:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
2	586	289	2569	0.228	587	0.3	1.901	A
3	674	492	2891	0.233	674	0.3	1.746	A
4	656	523	2718	0.241	656	0.3	1.838	A
1	155	770	1958	0.079	155	0.1	2.146	A

2033 Total, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	Arm 1 - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.

Junction Network

Junctions

Junction	Name	Junction Type	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Large Roundabout	2, 3, 4, 1	2.48	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

[same as above]

Roundabout Geometry

[same as above]

Large Roundabout Data

Arm	Circulating flow (PCU/hr)	Entry-to-exit separation (m)
2	644	88.00
3	591	40.00
4	643	101.00
1	847	48.00

Slope / Intercept / Capacity

[same as above]

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D5	2033 Total	AM	ONE HOUR	07:45	09:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
2		✓	803	100.000
3		✓	897	100.000
4		✓	875	100.000
1		✓	206	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		2	3	4	1
From	2	0	262	519	22
	3	358	0	223	316

	4	469	201	0	205
	1	23	55	128	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		2	**3**	**4**	**1**
From	**2**	0	6	4	0
	3	6	0	2	13
	4	5	3	0	8
	1	0	15	6	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max delay (s)	Max Queue (PCU)	Max LOS
2	0.36	2.43	0.6	A
3	0.38	2.39	0.7	A
4	0.39	2.57	0.7	A
1	0.14	2.75	0.2	A

Main Results for each time segment

07:45 - 08:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
2	605	288	2570	0.235	603	0.3	1.917	A
3	675	503	2879	0.235	674	0.3	1.754	A
4	659	523	2718	0.242	657	0.3	1.840	A
1	155	772	1956	0.079	155	0.1	2.146	A

08:00 - 08:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
2	722	345	2512	0.287	721	0.4	2.105	A
3	806	601	2765	0.292	806	0.4	1.974	A
4	787	625	2601	0.302	786	0.5	2.089	A
1	185	924	1819	0.102	185	0.1	2.366	A

08:15 - 08:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
2	884	422	2433	0.363	883	0.6	2.431	A
3	988	736	2609	0.378	987	0.7	2.382	A
4	963	766	2441	0.395	962	0.7	2.564	A
1	227	1131	1631	0.139	227	0.2	2.753	A

08:30 - 08:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
2	884	423	2433	0.363	884	0.6	2.433	A
3	988	737	2609	0.379	988	0.7	2.385	A
4	963	766	2440	0.395	963	0.7	2.567	A
1	227	1132	1630	0.139	227	0.2	2.754	A

08:45 - 09:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
2	722	346	2512	0.287	723	0.4	2.109	A
3	806	602	2764	0.292	807	0.4	1.977	A
4	787	626	2600	0.303	788	0.5	2.094	A
1	185	925	1817	0.102	185	0.1	2.370	A

09:00 - 09:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
2	605	289	2569	0.235	605	0.3	1.921	A
3	675	504	2877	0.235	676	0.3	1.759	A
4	659	524	2716	0.243	659	0.3	1.845	A
1	155	774	1954	0.079	155	0.1	2.149	A

Junctions 9

ARCADY 9 - Roundabout Module

Filename: Bassingbourne Rbt PM2.j9
Path: [redacted]
Report generation date: 18/07/2018 12:10:38

Summary of junction performance

	PM			
	Queue (PCU)	Delay (s)	RFC	LOS
	2017			
Arm 2	1.0	3.35	0.48	A
Arm 3	0.4	2.10	0.26	A
Arm 4	0.5	1.96	0.32	A
Arm 1	0.4	3.29	0.30	A
	2022 Base			
Arm 2	1.2	3.84	0.54	A
Arm 3	0.4	2.27	0.29	A
Arm 4	0.6	2.08	0.35	A
Arm 1	0.5	3.65	0.34	A
	2022 Total			
Arm 2	1.2	3.90	0.54	A
Arm 3	0.4	2.29	0.30	A
Arm 4	0.6	2.11	0.36	A
Arm 1	0.5	3.73	0.35	A
	2033 Base			
Arm 2	1.5	4.56	0.60	A
Arm 3	0.5	2.48	0.33	A
Arm 4	0.7	2.24	0.39	A
Arm 1	0.7	4.20	0.40	A
	2033 Total			
Arm 2	1.6	4.64	0.61	A
Arm 3	0.5	2.51	0.34	A
Arm 4	0.7	2.27	0.40	A
Arm 1	0.7	4.30	0.40	A

There are warnings associated with one or more model runs - see the 'Data Errors and Warnings' tables for each Analysis or Demand Set.

Values shown are the highest values encountered over all time segments. Delay is the maximum value of average delay per arriving vehicle.

File summary

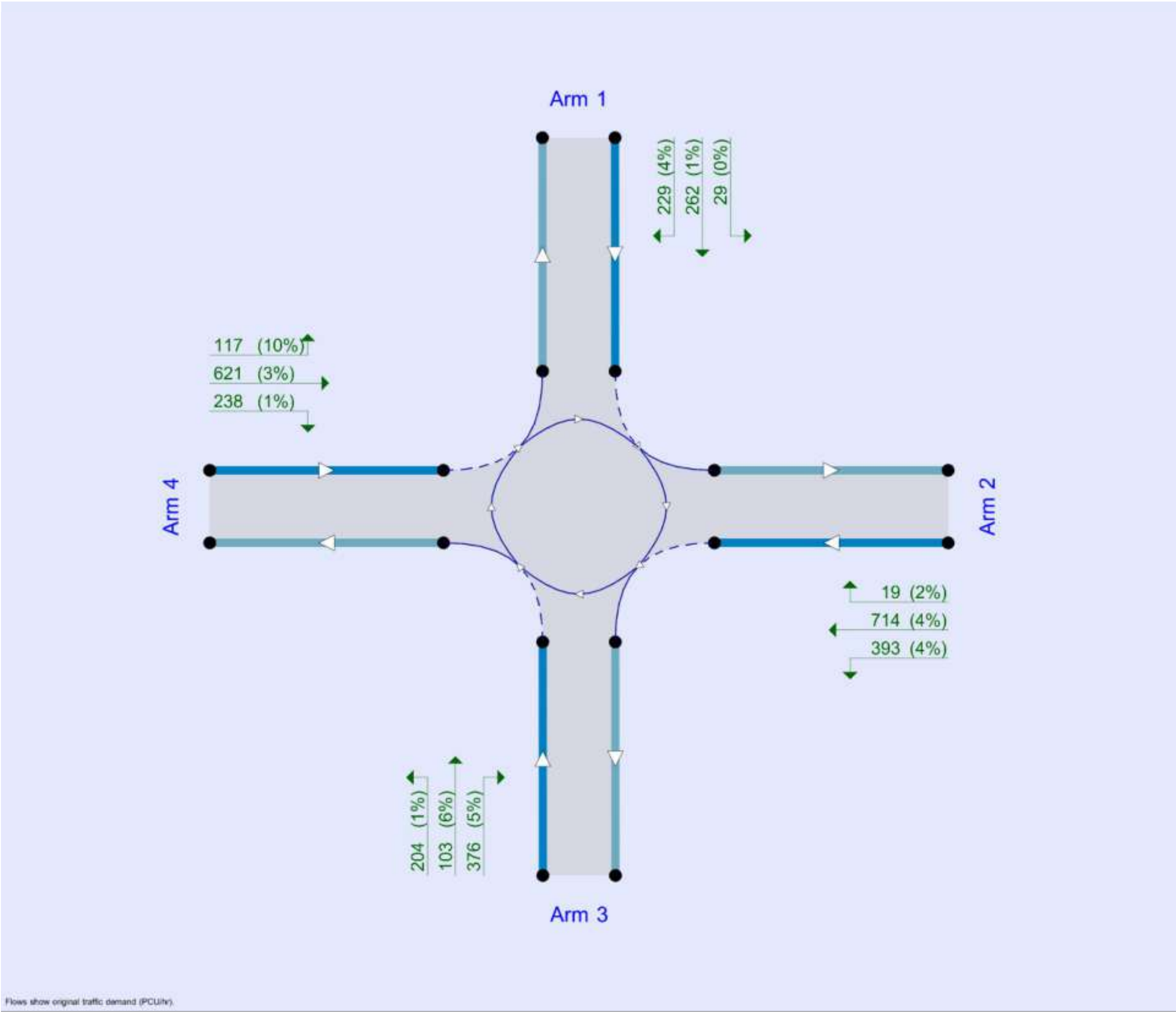
File Description

Title	Bassingourne Roundabout
Location	Stansted Airport
Site number	
Date	10/07/2018
Version	
Status	(new file)
Identifier	Elsenham
Client	

Jobnumber	11500582
Enumerator	CORP\UKAJM005
Description	

Units

Distance units	Speed units	Traffic units input	Traffic units results	Flow units	Average delay units	Total delay units	Rate of delay units
m	kph	PCU	PCU	perHour	s	-Min	perMin



The junction diagram reflects the last run of Junctions.

Analysis Options

Calculate Queue Percentiles	Calculate residual capacity	RFC Threshold	Average Delay threshold (s)	Queue threshold (PCU)
		0.85	36.00	20.00

Demand Set Summary

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D2	2017	PM	ONE HOUR	16:45	18:15	15
D3	2022 Base	PM	ONE HOUR	16:45	18:15	15
D4	2022 Total	PM	ONE HOUR	16:45	18:15	15
D5	2033 Base	PM	ONE HOUR	16:45	18:15	15
D6	2033 Total	PM	ONE HOUR	16:45	18:15	15

Analysis Set Details

ID	Network flow scaling factor (%)
A1	100.000

[redacted]

2017, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	Arm 1 - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.

Junction Network

Junctions

Junction	Name	Junction Type	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Large Roundabout	2, 3, 4, 1	2.67	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Name	Description
2	Themhall Avenue	
3	A120E	
4	A120W	
1	Bassingbourne Rd	

Roundabout Geometry

Arm	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit only
2	7.50	8.14	0.1	43.0	120.0	31.0	
3	7.30	11.12	11.3	50.0	120.0	34.0	
4	7.30	11.12	11.3	50.0	120.0	34.0	
1	3.65	8.15	37.5	50.0	120.0	39.0	

Large Roundabout Data

Arm	Circulating flow (PCU/hr)	Entry-to-exit separation (m)
2	644	88.00
3	736	40.00
4	406	101.00
1	1042	48.00

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Final slope	Final intercept (PCU/hr)
2	1.020	2864
3	1.121	3426
4	1.198	3371
1	0.869	2611

The slope and intercept shown above include any corrections and adjustments.

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D2	2017	PM	ONE HOUR	16:45	18:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
2		✓	947	100.000
3		✓	582	100.000
4		✓	829	100.000
1		✓	446	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		2	3	4	1
From	2	0	331	600	16
	3	317	0	176	89
	4	523	205	0	101
	1	23	226	197	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		2	3	4	1
From	2	0	4	4	2
	3	5	0	1	6
	4	3	1	0	10
	1	0	1	4	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max delay (s)	Max Queue (PCU)	Max LOS
2	0.48	3.35	1.0	A
3	0.26	2.10	0.4	A
4	0.32	1.96	0.5	A
1	0.30	3.29	0.4	A

Main Results for each time segment

16:45 - 17:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
2	713	472	2383	0.299	711	0.4	2.234	A
3	438	611	2741	0.160	437	0.2	1.620	A
4	624	317	2991	0.209	623	0.3	1.573	A
1	336	785	1928	0.174	335	0.2	2.311	A

17:00 - 17:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
2	851	564	2289	0.372	851	0.6	2.597	A
3	523	730	2607	0.201	523	0.3	1.791	A
4	745	379	2916	0.256	745	0.4	1.715	A
1	401	939	1795	0.223	401	0.3	2.642	A

17:15 - 17:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
2	1043	691	2160	0.483	1041	1.0	3.337	A
3	641	894	2423	0.264	640	0.4	2.094	A
4	913	464	2814	0.324	912	0.5	1.959	A
1	491	1150	1611	0.305	490	0.4	3.284	A

17:30 - 17:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
2	1043	691	2159	0.483	1043	1.0	3.347	A
3	641	895	2422	0.265	641	0.4	2.096	A
4	913	465	2814	0.324	913	0.5	1.959	A
1	491	1151	1611	0.305	491	0.4	3.289	A

17:45 - 18:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
2	851	565	2287	0.372	853	0.6	2.608	A
3	523	732	2605	0.201	524	0.3	1.793	A
4	745	380	2916	0.256	746	0.4	1.716	A
1	401	940	1794	0.224	402	0.3	2.648	A

18:00 - 18:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
2	713	473	2381	0.299	714	0.4	2.243	A
3	438	613	2739	0.160	438	0.2	1.625	A
4	624	318	2990	0.209	624	0.3	1.577	A
1	336	787	1927	0.174	336	0.2	2.317	A

2022 Base, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	Arm 1 - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.

Junction Network

Junctions

Junction	Name	Junction Type	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Large Roundabout	2, 3, 4, 1	2.97	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

[same as above]

Roundabout Geometry

[same as above]

Large Roundabout Data

Arm	Circulating flow (PCU/hr)	Entry-to-exit separation (m)
2	644	88.00
3	736	40.00
4	406	101.00
1	1042	48.00

Slope / Intercept / Capacity

[same as above]

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D3	2022 Base	PM	ONE HOUR	16:45	18:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
2		✓	1031	100.000
3		✓	626	100.000
4		✓	889	100.000
1		✓	481	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		2	3	4	1
From	2	0	360	654	17
	3	341	0	189	96

	4	561	220	0	108
	1	27	243	211	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		2	**3**	**4**	**1**
From	**2**	0	4	4	2
	3	5	0	1	6
	4	3	1	0	10
	1	0	1	4	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max delay (s)	Max Queue (PCU)	Max LOS
2	0.54	3.84	1.2	A
3	0.29	2.27	0.4	A
4	0.35	2.08	0.6	A
1	0.34	3.65	0.5	A

Main Results for each time segment

16:45 - 17:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
2	776	506	2348	0.331	774	0.5	2.372	A
3	471	662	2683	0.176	470	0.2	1.687	A
4	669	341	2962	0.226	668	0.3	1.624	A
1	362	843	1878	0.193	361	0.2	2.427	A

17:00 - 17:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
2	927	605	2246	0.413	926	0.7	2.829	A
3	563	792	2537	0.222	562	0.3	1.890	A
4	799	408	2882	0.277	799	0.4	1.788	A
1	432	1008	1735	0.249	432	0.3	2.828	A

17:15 - 17:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
2	1135	741	2108	0.538	1133	1.2	3.825	A
3	689	970	2339	0.295	689	0.4	2.263	A
4	979	499	2772	0.353	978	0.6	2.077	A
1	530	1234	1538	0.344	529	0.5	3.651	A

17:30 - 17:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
2	1135	742	2107	0.539	1135	1.2	3.845	A
3	689	971	2337	0.295	689	0.4	2.266	A
4	979	500	2772	0.353	979	0.6	2.077	A
1	530	1235	1537	0.345	530	0.5	3.655	A

17:45 - 18:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
2	927	607	2245	0.413	929	0.7	2.842	A
3	563	794	2535	0.222	563	0.3	1.896	A
4	799	409	2881	0.277	800	0.4	1.789	A
1	432	1010	1733	0.249	433	0.3	2.834	A

18:00 - 18:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
2	776	508	2346	0.331	777	0.5	2.384	A
3	471	665	2680	0.176	472	0.2	1.690	A
4	669	342	2961	0.226	670	0.3	1.628	A
1	362	845	1876	0.193	363	0.2	2.433	A

2022 Total, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	Arm 1 - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.

Junction Network

Junctions

Junction	Name	Junction Type	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Large Roundabout	2, 3, 4, 1	3.01	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

[same as above]

Roundabout Geometry

[same as above]

Large Roundabout Data

Arm	Circulating flow (PCU/hr)	Entry-to-exit separation (m)
2	644	88.00
3	736	40.00
4	406	101.00
1	1042	48.00

Slope / Intercept / Capacity

[same as above]

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D4	2022 Total	PM	ONE HOUR	16:45	18:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
2		✓	1043	100.000
3		✓	633	100.000
4		✓	903	100.000
1		✓	481	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		2	3	4	1
From	2	0	364	662	17
	3	348	0	189	96

	4	575	220	0	108
	1	27	243	211	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		2	**3**	**4**	**1**
From	**2**	0	4	4	2
	3	5	0	1	6
	4	3	1	0	10
	1	0	1	4	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max delay (s)	Max Queue (PCU)	Max LOS
2	0.54	3.90	1.2	A
3	0.30	2.29	0.4	A
4	0.36	2.11	0.6	A
1	0.35	3.73	0.5	A

Main Results for each time segment

16:45 - 17:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
2	785	506	2348	0.334	783	0.5	2.385	A
3	477	668	2676	0.178	476	0.2	1.696	A
4	680	346	2956	0.230	679	0.3	1.636	A
1	362	859	1864	0.194	361	0.2	2.449	A

17:00 - 17:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
2	938	605	2246	0.417	937	0.7	2.852	A
3	569	799	2529	0.225	569	0.3	1.904	A
4	812	414	2874	0.282	811	0.4	1.805	A
1	432	1027	1718	0.252	432	0.3	2.864	A

17:15 - 17:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
2	1148	741	2108	0.545	1146	1.2	3.879	A
3	697	978	2329	0.299	696	0.4	2.288	A
4	994	507	2763	0.360	994	0.6	2.104	A
1	530	1258	1518	0.349	529	0.5	3.720	A

17:30 - 17:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
2	1148	742	2107	0.545	1148	1.2	3.898	A
3	697	980	2327	0.300	697	0.4	2.290	A
4	994	508	2763	0.360	994	0.6	2.106	A
1	530	1258	1517	0.349	530	0.5	3.729	A

17:45 - 18:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
2	938	607	2245	0.418	940	0.7	2.866	A
3	569	802	2527	0.225	570	0.3	1.907	A
4	812	415	2874	0.282	812	0.4	1.807	A
1	432	1028	1717	0.252	433	0.3	2.870	A

18:00 - 18:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
2	785	508	2346	0.335	786	0.5	2.396	A
3	477	671	2674	0.178	477	0.2	1.702	A
4	680	347	2955	0.230	680	0.3	1.637	A
1	362	861	1862	0.194	363	0.2	2.457	A

2033 Base, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	Arm 1 - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.

Junction Network

Junctions

Junction	Name	Junction Type	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Large Roundabout	2, 3, 4, 1	3.39	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

[same as above]

Roundabout Geometry

[same as above]

Large Roundabout Data

Arm	Circulating flow (PCU/hr)	Entry-to-exit separation (m)
2	644	88.00
3	736	40.00
4	406	101.00
1	1042	48.00

Slope / Intercept / Capacity

[same as above]

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D5	2033 Base	PM	ONE HOUR	16:45	18:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
2		✓	1114	100.000
3		✓	676	100.000
4		✓	962	100.000
1		✓	520	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		2	3	4	1
From	2	0	389	706	19
	3	369	0	204	103

	4	607	238	0	117
	1	29	262	229	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		2	**3**	**4**	**1**
From	**2**	0	4	4	2
	3	5	0	1	6
	4	3	1	0	10
	1	0	1	4	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max delay (s)	Max Queue (PCU)	Max LOS
2	0.60	4.56	1.5	A
3	0.33	2.48	0.5	A
4	0.39	2.24	0.7	A
1	0.40	4.20	0.7	A

Main Results for each time segment

16:45 - 17:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
2	839	547	2306	0.364	836	0.6	2.539	A
3	509	716	2623	0.194	508	0.2	1.765	A
4	724	369	2929	0.247	723	0.3	1.689	A
1	391	912	1818	0.215	390	0.3	2.580	A

17:00 - 17:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
2	1001	655	2196	0.456	1000	0.9	3.122	A
3	608	857	2465	0.247	607	0.3	2.010	A
4	865	441	2842	0.304	864	0.5	1.883	A
1	467	1091	1663	0.281	467	0.4	3.078	A

17:15 - 17:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
2	1227	801	2047	0.599	1224	1.5	4.528	A
3	744	1048	2250	0.331	744	0.5	2.476	A
4	1059	540	2724	0.389	1058	0.7	2.236	A
1	573	1336	1450	0.395	571	0.7	4.188	A

17:30 - 17:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
2	1227	803	2045	0.600	1226	1.5	4.564	A
3	744	1050	2248	0.331	744	0.5	2.482	A
4	1059	541	2723	0.389	1059	0.7	2.238	A
1	573	1337	1449	0.395	573	0.7	4.202	A

17:45 - 18:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
2	1001	657	2194	0.456	1004	0.9	3.146	A
3	608	860	2462	0.247	608	0.3	2.015	A
4	865	442	2841	0.304	866	0.5	1.885	A
1	467	1092	1661	0.281	469	0.4	3.090	A

18:00 - 18:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
2	839	549	2304	0.364	840	0.6	2.556	A
3	509	719	2619	0.194	509	0.3	1.771	A
4	724	370	2928	0.247	725	0.3	1.693	A
1	391	915	1816	0.216	392	0.3	2.587	A

[redacted]

2033 Total, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	Arm 1 - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.

Junction Network

Junctions

Junction	Name	Junction Type	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Large Roundabout	2, 3, 4, 1	3.45	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

[same as above]

Roundabout Geometry

[same as above]

Large Roundabout Data

Arm	Circulating flow (PCU/hr)	Entry-to-exit separation (m)
2	644	88.00
3	736	40.00
4	406	101.00
1	1042	48.00

Slope / Intercept / Capacity

[same as above]

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D6	2033 Total	PM	ONE HOUR	16:45	18:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
2		✓	1126	100.000
3		✓	683	100.000
4		✓	976	100.000
1		✓	520	100.000

Origin-Destination Data

Demand (PCU/hr)

		To			
		2	3	4	1
From	2	0	393	714	19
	3	376	0	204	103

[redacted] [redacted]

	4	621	238	0	117
	1	29	262	229	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		2	**3**	**4**	**1**
From	**2**	0	4	4	2
	3	5	0	1	6
	4	3	1	0	10
	1	0	1	4	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max delay (s)	Max Queue (PCU)	Max LOS
2	0.61	4.64	1.6	A
3	0.34	2.51	0.5	A
4	0.40	2.27	0.7	A
1	0.40	4.30	0.7	A

Main Results for each time segment

16:45 - 17:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
2	848	547	2306	0.368	845	0.6	2.554	A
3	514	722	2616	0.197	513	0.3	1.775	A
4	735	374	2922	0.251	733	0.3	1.702	A
1	391	928	1804	0.217	390	0.3	2.602	A

17:00 - 17:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
2	1012	655	2196	0.461	1011	0.9	3.151	A
3	614	864	2457	0.250	614	0.3	2.025	A
4	877	447	2835	0.310	877	0.5	1.902	A
1	467	1110	1646	0.284	467	0.4	3.121	A

17:15 - 17:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
2	1240	801	2047	0.606	1237	1.6	4.600	A
3	752	1057	2241	0.336	751	0.5	2.506	A
4	1075	548	2714	0.396	1074	0.7	2.269	A
1	573	1359	1430	0.400	571	0.7	4.286	A

17:30 - 17:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
2	1240	803	2045	0.606	1240	1.6	4.638	A
3	752	1059	2238	0.336	752	0.5	2.512	A
4	1075	548	2714	0.396	1075	0.7	2.272	A
1	573	1360	1429	0.401	573	0.7	4.301	A

17:45 - 18:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
2	1012	657	2194	0.461	1015	0.9	3.175	A
3	614	867	2453	0.250	615	0.3	2.033	A
4	877	448	2834	0.310	878	0.5	1.905	A
1	467	1111	1645	0.284	469	0.4	3.133	A

18:00 - 18:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	LOS
2	848	549	2304	0.368	849	0.6	2.572	A
3	514	725	2613	0.197	515	0.3	1.779	A
4	735	375	2921	0.252	735	0.3	1.704	A
1	391	930	1802	0.217	392	0.3	2.614	A

Appendix C

TRAFFIC SURVEY SPECIFICATION

MEMO

TO	Essex County Council	**FROM**	WSP
DATE	**19 April 2018**	**CONFIDENTIALITY**	**Confidential**
SUBJECT	**Stansted Mountfitchet Data Collection - 2018**		

Background

WSP intend to undertake an additional data gathering exercise to help to reinforce the Stansted Mountfitchet VISSIM model. This model has been developed as part of the transport assessment that will support the planning application for the development of land east of Elsenham. The data collection exercise will focus on increasing the level of observations with particular emphasis on queue lengths at the Grove Hill signalised junction and along Chapel Hill.

Proposed Data Collection Specification

Automatic traffic count data from February 2017 on the B1051 (east of Stansted Mountfitchet) and the B1383 (west of Stansted Mountfitchet) demonstrate that flows on a Monday are typically lower than other weekdays during the AM peak. It also highlighted that flows on a Friday are typically higher during both peak periods. WSP therefore propose to focus the majority of data collection on Tuesdays, Wednesdays and Thursdays to obtain a more neutral dataset which is in line with guidance provided by the Department for Transport (WebTAG).

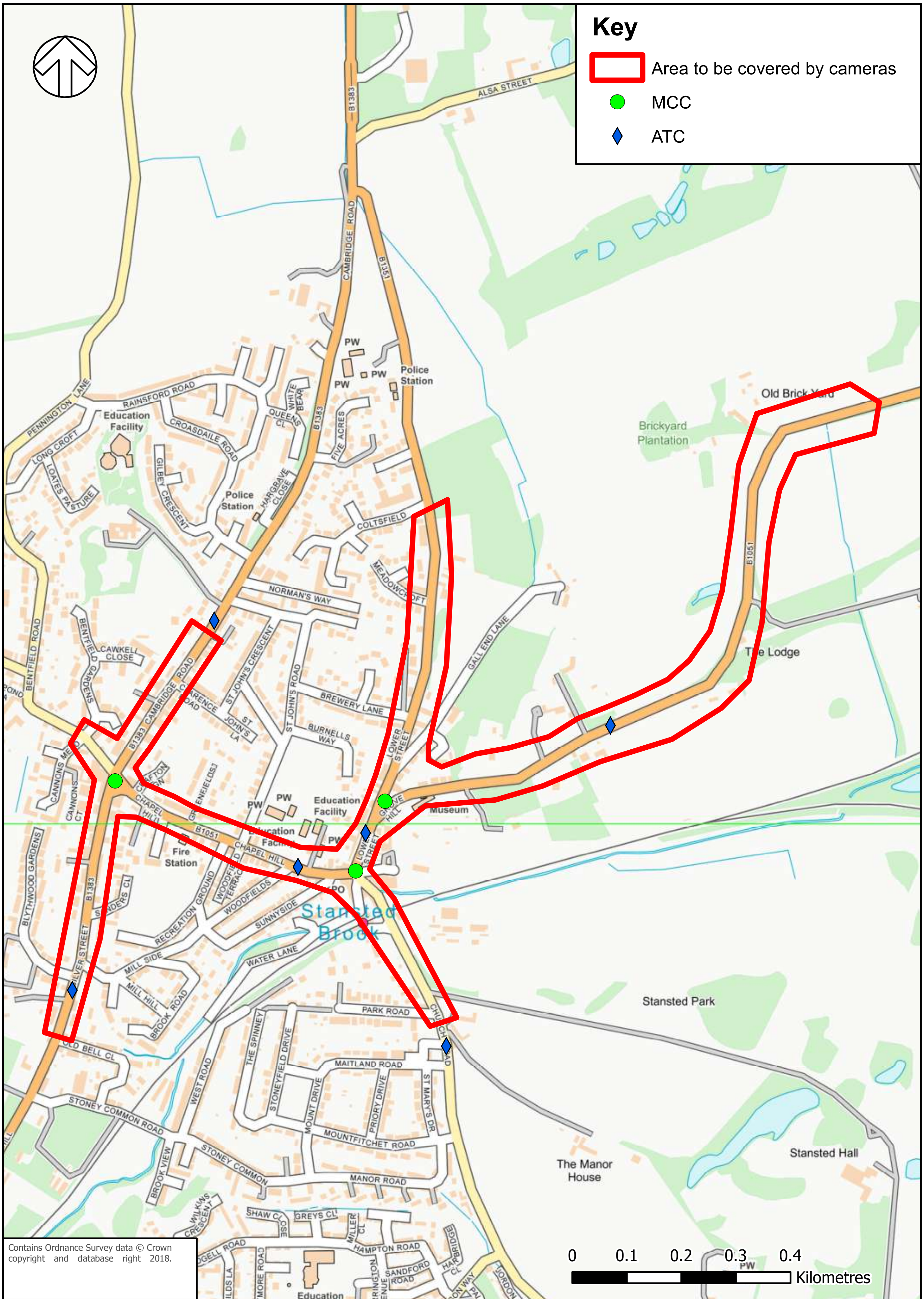
The three core junctions that will be the focus of the data collection exercise are the Cambridge Road / Chapel Hill crossroads, the Chapel Hill / Church Road mini roundabout and the Grove Hill traffic signals.

Surveys will be conducted during a neutral period, outside of the school holidays or the preceding week when traffic flows are typically lower. WebTAG guidance states that the following periods can be neutral:

- *late March and April – excluding the weeks before and after Easter;*
- *May - excluding the Thursday before and all of the week of each Bank Holiday;*
- *June;*
- *September – excluding school holidays or return to school weeks;*
- *all of October; and*
- *all of November – provided adequate lighting is available.*

The following types of data are proposed for collection:

- Queue length surveys at the three core junctions for the AM and PM peak periods (07:00-10:00 and 16:00-19:00) on neutral weekdays in separate but consecutive weeks. Queues are expected to be contained within the red boundary shown in figure 1 below, but care should be taken to ensure the maximum length of all queues is captured in 5 minute intervals.
- Signal timing survey to record green times, stopping amber, red times, starting amber and cycle times at the Grove Hill signals (same times and days as the queue length surveys)
- Manual classified turning counts (same times and days as the queue length surveys).
- Travel time surveys along Silver Street, Chapel Hill and Grove Hill (same times and days as the queue length surveys). Our preferred method of collection is to use ANPR cameras as this will capture a larger sample size than the floating car method.
- Parking survey to monitor the use of parking bays along Chapel Hill and Grove Hill (same times and days as the queue length surveys).
- Automatic link counts over a full two week period which must coincide with the weeks during which the queue length surveys take place.
- Video footage of the entire length of Chapel Hill and Grove Hill will be collected to ensure all queues and interaction between parked and non-parked vehicles is identified (the queue length and parking surveys should cover most of this area but additional cameras may be required to ensure all stretches are visible).



wsp

TITLE:

STANSTED MOUNTFITCHET
DATA COLLECTION

FIGURE No:

Figure 1

File:
Drawn By:
Date Modified:

Appendix D

MODELLING UPDATE PAPER

Public

LAND EAST OF ELSENHAM: STANSTED MOUNTFITCHET MICROSIMULATION MODELLING UPDATE

22nd November 2018

1. Introduction

1.1 This note has been prepared by WSP to explain how the Stansted Mountfitchet Microsimulation Model has been updated in response to the comments made by Essex County Council (ECC) regarding the Transport Assessment issued in December 2017.

1.2 This note covers the following items:

- New traffic surveys;
- Update of the Stansted Mountfitchet Microsimulation Model;
- Forecast year results; and
- Mitigation proposal at Grove Hill.

2. New traffic surveys

2.1 New traffic surveys were commissioned in June/July 2018, including classified turning counts, automatic traffic counts, queue lengths, journey times, on-street parking bay occupation and signal timings analysis. The main aim of these surveys was to check the queue lengths on the Grove Hill approach to the Lower Street signalised junction and the journey times through Stansted Mountfitchet.

2.2 The surveys were undertaken on 27/06/2018 (Wednesday) and on 04/07/2018 (Wednesday). On 04/07/2018, the car parking bays on a section of Chapel Hill in Stansted Mountfitchet were coned off during the AM peak in preparation for new white-line painting, thus removing one of the existing constraints to traffic flows through Stansted Mountfitchet. The survey data from 27/06/2018 has therefore been the focus of the latest analysis.

2.3 Table 1 shows the maximum surveyed queue on the Grove Hill approach to the Lower Street junction during the AM and PM peak. Data is displayed from the February 2017 and June 2018 surveys. It is evident that the latest observed queues significantly exceed those recorded in 2017 and a decision has therefore been made to re-calibrate the microsimulation model to the latest data.

Table 1 – Observed maximum queue on Grove Hill approach to Grove Hill / Lower Street junction (in number of vehicles)

	AM	PM
Survey Data February 2017	5	4
Survey Data June 2018	29	14

2.4 Journey times through Stansted Mountfitchet were obtained for the peak hour only, as per ECC indications. The journey times were collected from video footage, with a sample size of 60 measurements per hour and route.

3. Stansted Mountfitchet model update

3.1 Based on the new traffic survey data, the following changes were applied to the model.

- Traffic flows in the model were updated with the data from the new traffic survey.
- Overtaking behaviour at on-street parking sections was modified and modelled as a set of priority rules to allow for a more detailed modelled behaviour.

– The modelled traffic signal controller at Grove Hill / Lower Street was modified to better represent the operation of the on-street controller. TfL's VA VAP template was used to create the modelled signal controller. This template allows any vehicle actuated junction to be accurately represented in VISSIM providing site-specific parameters from the on-street signal controller specification document are input. Minimum and maximum green times, extensions, intergreens, etc. were obtained from the signal specification provided by ECC. New detectors were placed on the network based on aerial images and plans provided by ECC.

– The driving behaviour on the Grove Hill approach was analysed from video footage and replicated in the model in detail. The video footage revealed two different behaviours depending on the level of congestion at the approach. During the AM peak, due to higher levels of congestion drivers are, in general, more hesitant to go through the on-street parking section and hence the headway between vehicles is significantly longer than usual. During the PM peak, the level of congestion is lower and vehicles do not hesitate as much. The headway between vehicles in this case remains more comparable to the rest of the network.

3.2 After the model was updated, a queue calibration process was performed and the model was validated against journey times. The queue calibration on the Grove Hill approach and journey time validation through Stansted Mountfitchet are shown in Figure 1 and Table 2 respectively.

3.3 The queue on the Grove Hill approach has been divided into a primary queue at the southbound stopline and a secondary queue before the on-street parking bays to better calibrate the model. The model average queue is comparable to the observed queue, which gives confidence that the model is able to predict conditions appropriately.

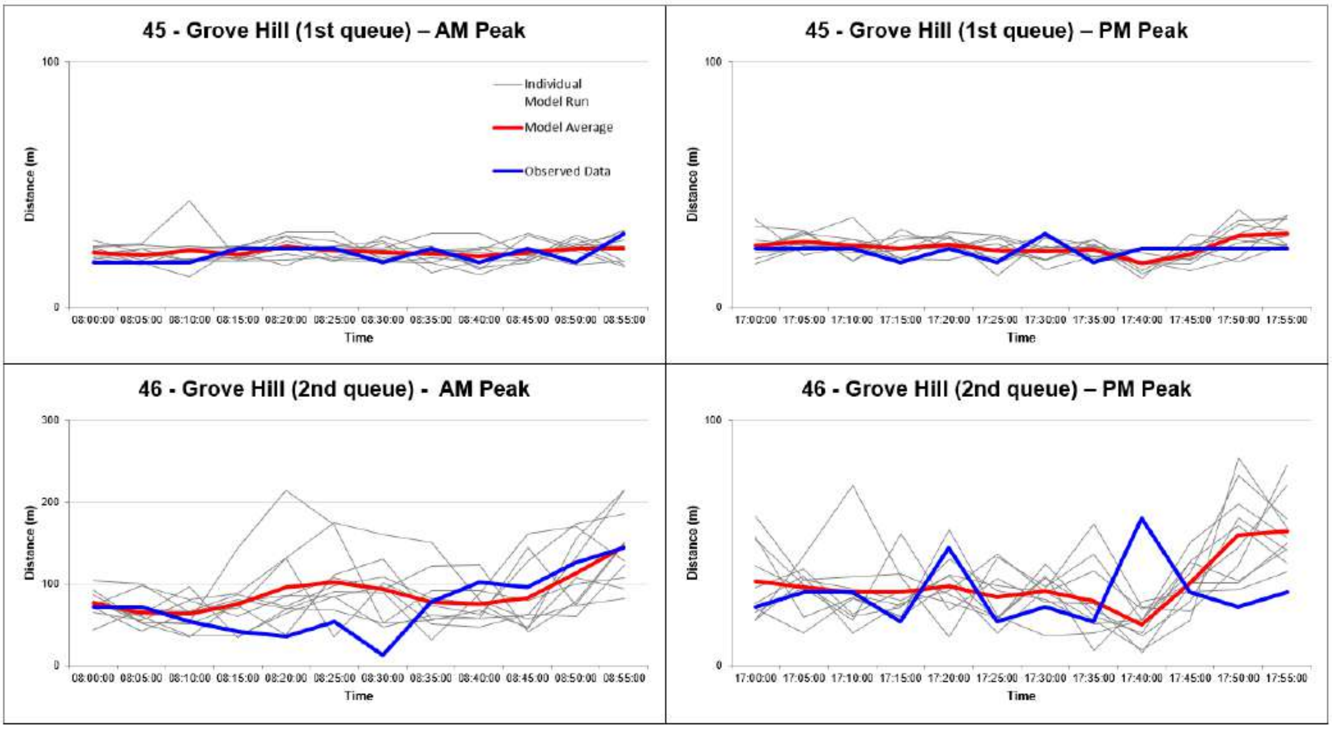


Figure 1 – Base year queue validation. Maximum queue length (in meters)

3.4 Table 2 shows the average journey time between Grove Hill (at Gorsefield school) and the Silver Street / Mill Side junction via Chapel Hill. The journey time validation criteria set out in WebTAG states that the modelled times along routes should be within 15% of surveyed times in more than 85% of the routes. In this case, all the routes are within 15% of the of surveyed times and thus the model validates against observed data.

Table 2 – Journey Time validation. Average journey time (in seconds)

	Westbound				Eastbound			
	Observed	Model	Diff (s)	Diff (%)	Observed	Model	Diff (s)	Diff (%)
AM	225	224	-1	-0.4%	199	190	-9	-4.5%
PM	215	217	2	0.9%	208	185	-23	-11.1%

4. Forecast Year

4.1 The validated base model has been used to produce a forecast of traffic conditions in Stansted Mountfitchet for an assessment year of 2023. Two different forecast scenarios have been modelled; a reference case which includes traffic related to committed developments in the vicinity of Stansted Mountfitchet and Elsenham ("2023+C" in the graphs) and a scenario which includes the committed developments and the Land east of Elsenham proposed development ("2023+C+D" in the graphs).

4.2 The analysis of the forecast year results presented in this note is focused on the impact that additional traffic has on the Grove Hill southbound approach, as well as the journey times through Stansted Mountfitchet. The graphs shown below display the maximum queue recorded during each 5-minute period, averaged over all simulation runs by scenario.

4.3 Figure 2 shows the queue lengths during the AM peak at the secondary queue on the Grove Hill southbound approach. The graph shows that the queues on both forecast scenarios are much longer than in the base year, reaching a maximum queue length of 825m and 1,621m for the committed and committed + proposed scenarios respectively. During the whole simulation, the arrival rate of vehicles joining the queue is greater than the departure rate, demonstrating that the junction operates over capacity. Not only that, but the effect is likely extend to the next time period if this level of demand is sustained and it would take some time to revert back to uncongested conditions.

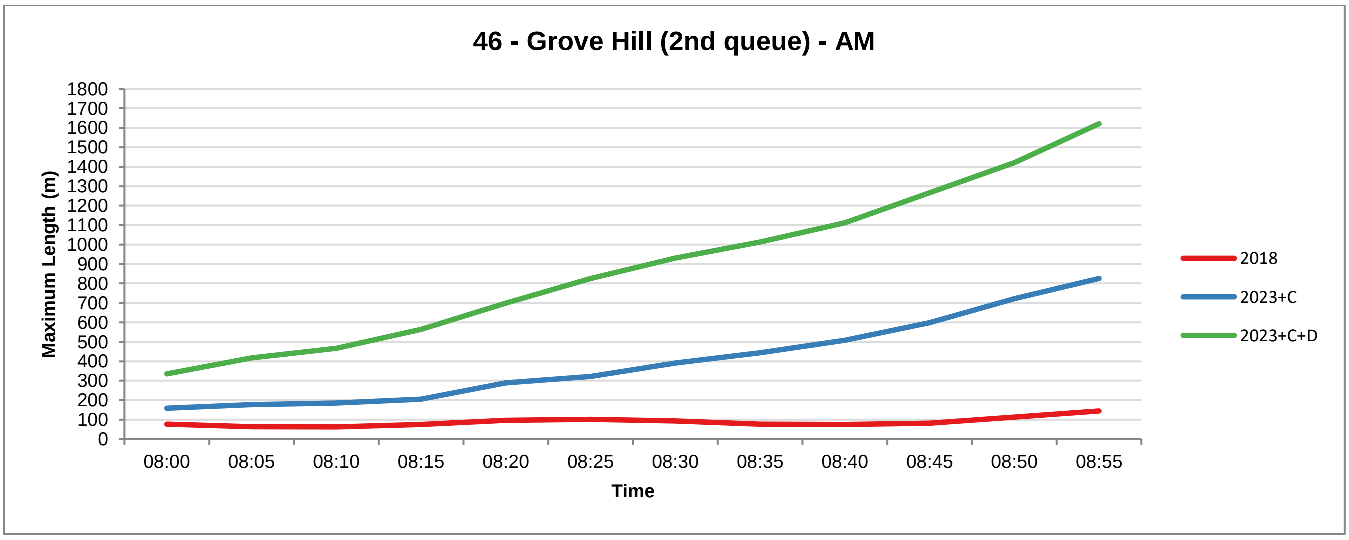


Figure 2 – Grove Hill queue length (2nd queue) – AM Peak

4.4 Figure 3 shows the queue lengths at the secondary queue on the Grove Hill southbound approach during the PM peak. Even though the queues for the forecast scenarios are lower than in the AM peak, they are still much longer than during the base year and if this level of demand is sustained the junction will operate over capacity.

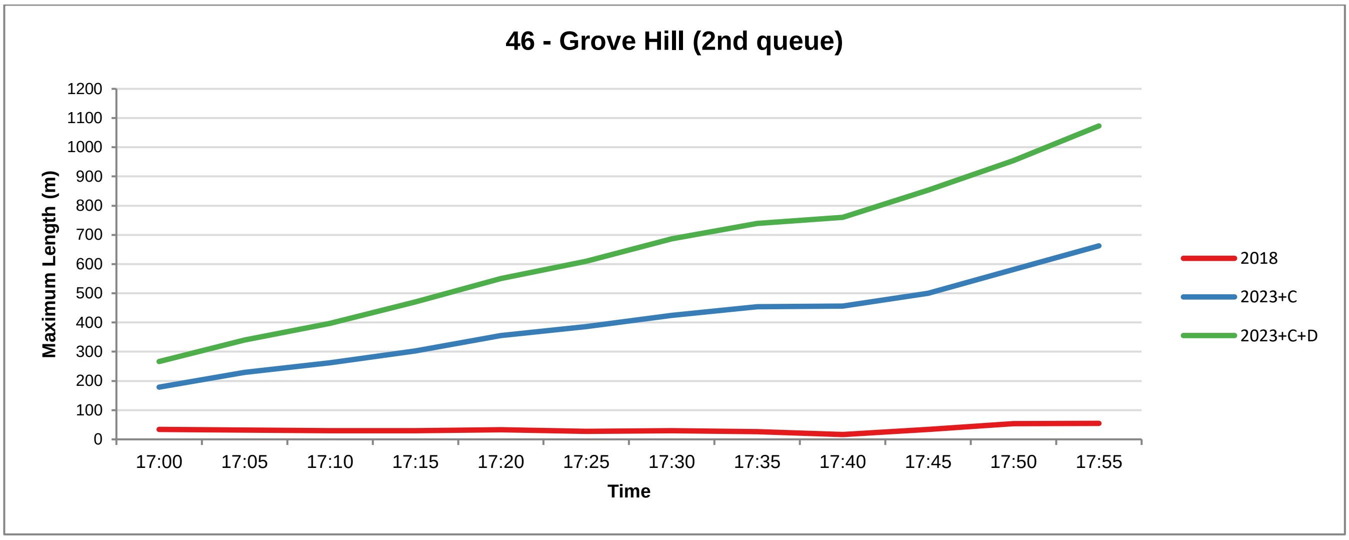


Figure 3 - Grove Hill queue length (2nd queue) – PM Peak

4.5 Table 3 shows the average journey time between Grove Hill (at Gorsefield school) and the Silver Street / Mill Side junction via Chapel Hill. For the westbound direction, the Grove Hill end of the section has been extended up to the M11 bridge to capture the additional delay caused by queuing vehicles on Grove Hill.

Table 3 - Average journey time (in minutes) through Stansted Mountfitchet

Scenario	Westbound		Eastbound	
	AM	PM	AM	PM
2018	5.6	5.4	3.2	3.1
2023 + Com. Dev.	12.3	18.5	3.4	3.5
2023 + Com. Dev. + Prop. Dev	19.8	25.9	3.5	3.7

4.6 The average journey time westbound would be double in the AM peak and almost quadruple in the PM peak for the 2023 + Committed Development scenario compared to the base year. This would have a significant impact on drivers travelling from Elsenham towards Bishops Stortford, and it is likely that they would reroute to other roads such as the A120 (through Stansted Airport). The journey times predicted as a result of adding the proposed development traffic are worse still.

4.7 The effect of the additional traffic from the forecast scenarios on the eastbound movement is not significant.

4.8 In summary, the effect of the additional traffic on both forecast scenarios leads to queue lengths beyond operational levels on the Grove Hill southbound approach and notable increases in westbound journey times. As a result of this, mitigation is recommended at this junction regardless of whether the proposed development is granted permission.

5. Mitigation Proposal

5.1 During the observation of the video footage at the Grove Hill southbound approach it was evident that the current signals do not operate efficiently. A single detector for the southbound phase is located at the southbound stopline. This detector acts as both a demand and extension detector, with an extension of four seconds. Vehicles waiting in the secondary queue give way to the oncoming traffic overtaking parked cars, and by the time they can proceed to the signal head, it has turned red as the extension time has gapped out.

5.2 Figure 4 shows the southbound green time distribution obtained from the survey during the AM peak. Even though there was demand at the secondary queue during 80% of the cycles in the AM peak, the graph shows that 60% of the time the stage is run with a short green time (16s or shorter), demonstrating that the vehicles at the secondary queue are not able to reach the detector before it gaps out. During these cycles, only the vehicles in the primary queue are able to proceed (2-3 vehicles on average). This creates a constraint in terms of the throughput of the southbound movement.

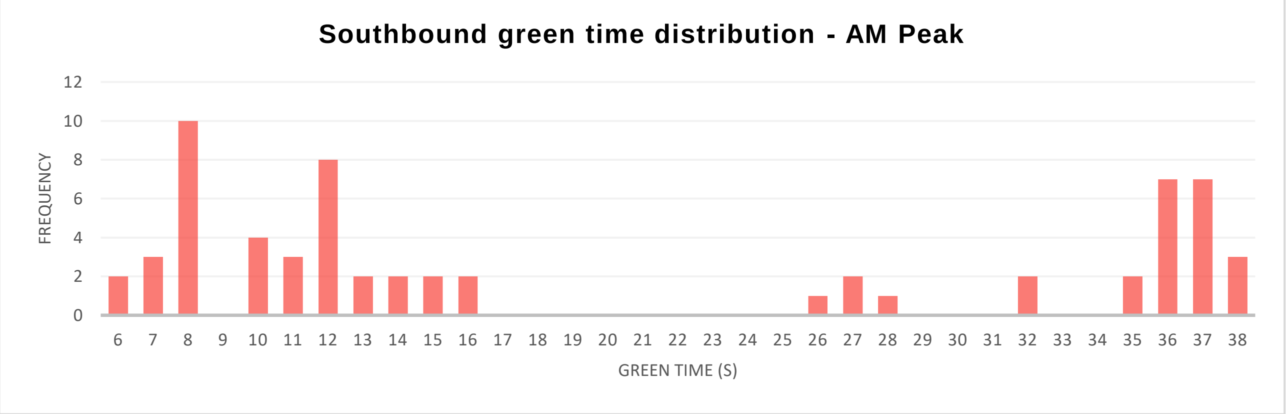


Figure 4 – Grove Hill / Lower Street signal. Observed southbound green time distribution – AM peak.

5.3 In addition to this, the majority of cycles where the southbound stage reaches the maximum green is due to no demand for the northbound movement and not a registered southbound extension. In the forecast years, when demand on both approaches will be higher, the likelihood of extended green stages will be reduced.

5.4 In order to solve the gap-changing problem on the southbound approach, a new detector is proposed to register the presence of vehicles in the secondary queue, as shown in Figure 5. This detector would act as both a demand and an extension detector. This detector should prevent gap-changes when demand is present and allow the vehicles in the secondary queue to proceed with less delay.

Figure 5 – Approximate location of the proposed detector

5.5 In addition to the detector, maximum green times are proposed for modification to take into account the increased demand at the junction. The proposed maximum green times are shown in Table 4. These maximum green times have not been optimised and have been chosen to avoid cutting short northbound stages in the AM peak and southbound stages in the PM peak.

Table 4 – Proposed maximum green times (in seconds)

Phase	AM	PM
A (northbound)	25	40
B (southbound)	40	25

5.6 Figure 6 and Figure 7 show the queue lengths on the Grove Hill approach during the AM and PM peak respectively. The graphs indicate that the proposed mitigation ("2023Mit" on the graphs) greatly reduces the maximum queues on the approach, back to a level similar to that experienced during the base year. This demonstrates that the proposed mitigation fulfils its purpose by avoiding unjustified gap changing and reducing queue lengths .

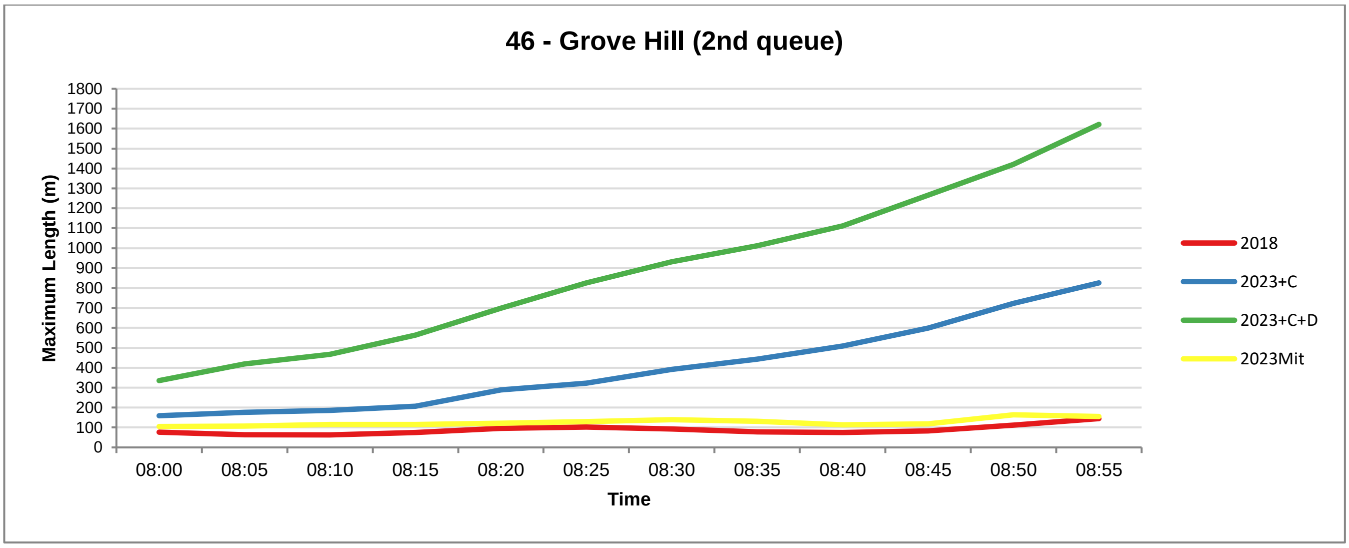


Figure 6 – Grove Hill queue length (2nd queue) – AM Peak

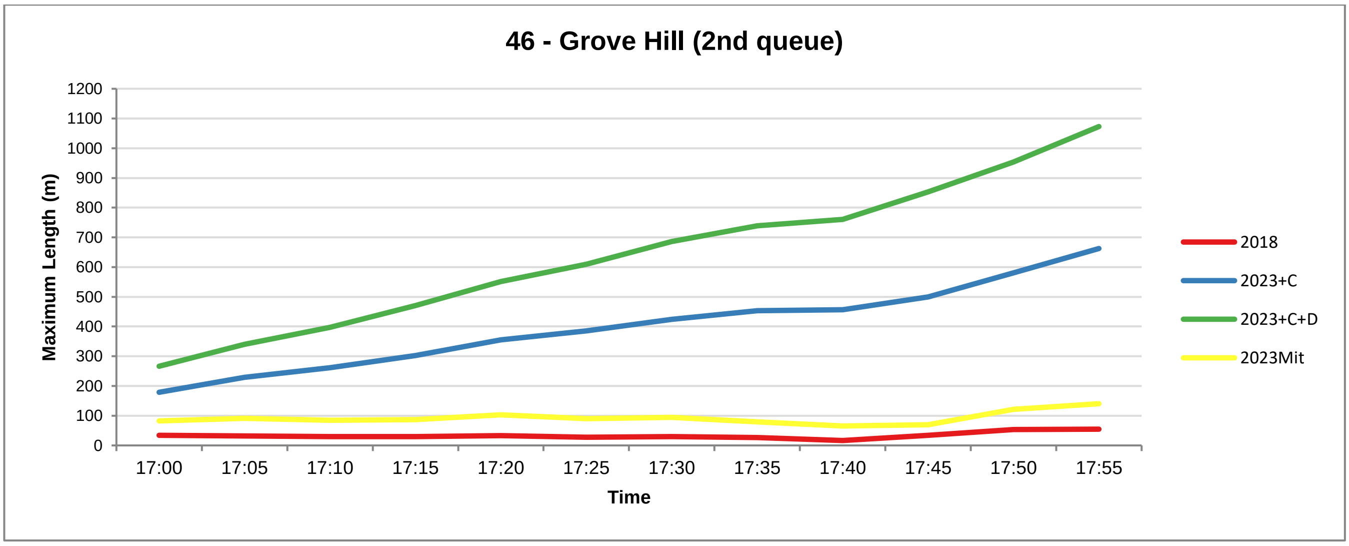


Figure 7 - Grove Hill queue length (2nd queue) – PM Peak

5.7 Table 5 shows the average journey time through Stansted Mountfitchet for the different scenarios. The implementation of the proposed mitigation has a significant improvement on the westbound journey time, with a reduction of 13 minutes in the AM peak and 19 minutes in the PM peak compared to the scenario without the mitigation. The mitigation also represents a significant improvement compared to the 2023 + committed development scenario which is likely to result in significantly longer delays even without the presence of proposed development on the Land east of Elsenham.

5.8 The mitigation would result in the westbound journey time reverting back to approximately base year conditions during the AM peak. Even though the westbound journey time during the PM peak and the eastbound journey time during the AM and PM peaks are slightly higher than in the base year, the difference is likely to be comparable to daily variations as presently experienced on the road network in Stansted Mountfitchet.

5.9

Table 5 – Average Journey time (in minutes) through Stansted Mountfitchet.

Scenario	Westbound		Eastbound	
	AM	PM	AM	PM
2018	5.6	5.4	3.2	3.1
2023 + Com. Dev.	12.3	18.5	3.4	3.5
2023 + Com. Dev. + Prop. Dev	19.8	25.9	3.5	3.7
2023 + Com. Dev. + Prop. Dev (with mitigation)	6.5	7.0	4.3	4.2

Appendix E

NOTES OF MEETING WITH ECC 26TH NOV 2018

Public

Land North East of Elsenham

Meeting with Essex County Council: 26th November 2018 at County Hall, Chelmsford

Principal matters discussed and actions arising

Present

Katherine Wilkinson	Essex County Council
Matt Bradley	Essex County Council
Tony Fitch	Essex County Council – traffic signals
John Silvester	Essex County Council – traffic signals
Eduardo Carbajo Fuertes	WSP
Gerry Corrance	WSP

Matters discussed

1 WSP stated that the purpose of the meeting was to update Essex County Council regarding highways + traffic related progress since the last meeting on 27th March 2018.

2 WSP referred to the feedback received from ECC at that last meeting, particularly concerns that the traffic surveys (2017) used to underpin the Elsenham planning application's Transport Assessment had not captured the full extent of queuing at the Grove Hill (Stansted Mountfitchet) traffic signals.

3 WSP stated that traffic surveys had been undertaken over the two-week period 25th June to 8th July 2018 at Stansted Mountfitchet. The specification for those surveys had been agreed beforehand with ECC.

4 WSP stated that the results of the 2018 surveys generally compared favourably with the 2017 traffic surveys with respect to traffic levels. However, the 2018 survey confirmed that the 2017 survey had under-reported queuing at Grove Hill.

5 It was noted that the 2017 survey had captured the short primary queue of traffic at the Grove Hill signals (ie waiting to enter the Grove Hill signals from the east), but hadn't captured the secondary queue of traffic. The secondary queue begins on the eastern side of the on-street parking and extends in the direction of Elsenham.

6 WSP showed video extracts from the 2018 survey which showed how the existing Grove Hill signals don't accommodate the traffic demand from the Elsenham direction. Traffic travelling eastwards towards Elsenham and passing on-street parking interrupts the flow of traffic travelling towards the signals. As a result, the signals green aspect doesn't extend. The overall result is that there is sizeable westbound queuing at Grove Hill because the signals underestimate traffic demand: this queuing occurs in both peak periods.

7 WSP explained that the Stansted Mountfitchet microsimulation model had been adjusted to reflect observed traffic conditions from the 2018 survey, particularly with respect to the interaction of eastbound and westbound traffic and on-street parked cars at Grove Hill. Journey times have also been adjusted to reflect surveyed journey times. Driver behaviour at Grove Hill has also been modified in the model to reflect observed behaviour.

8 ECC described their traffic signals improvement scheme for Grove Hill which is due to be implemented approx. Spring 2019. The improvements largely involve the replacement of ageing traffic signals equipment. However, ECC stated that they expected that their improvement scheme would provide some improvement in the performance of the Grove Hill signals.

9 ECC agreed that their improvement scheme would not detect the secondary queue of traffic waiting to enter the Grove Hill signals. It was agreed that the ECC scheme by itself would do little to mitigate the westbound queuing at the signals.

10 WSP outlined their proposed mitigation measures for Grove Hill. This involves providing an advance signals detector loop at a location to the east of the on-street parking. This loop would detect the secondary westbound traffic queue and allow the signals' green aspect to extend. This would allow more westbound traffic to pass through the signals and reduce westbound queuing and delay as a result.

11 WSP stated that allowing more westbound traffic through the signals would have minimal impact on Grove Hill eastbound traffic queuing. It would also have minimal impact on other junctions within Stansted Mountfitchet town centre, particularly the Chapel Street mini-roundabout junction.

Action: WSP to provide microsimulation model video clips for both peak hours to enable ECC to review the results of mitigation on the local highway network.

12 It was established that WSP's mitigation scheme is compatible with ECC's signals improvement scheme. It was noted that the mitigation measures could be installed separately and at a later date to the ECC works (ie the ECC scheme would be installed by the time the Elsenham application passes through the planning process and the subsequent time required for detailed highway design and the s278 process).

13 WSP stated that they have the capability to undertake the detailed design of traffic signals installations (Andy Lunn, based at WSP's Hertford office). Once planning

consent for the Elsenham development has been granted, WSP will liaise with ECC traffic signals dept. to progress the design of the mitigation measures. It was agreed that the detailed design of the mitigation scheme would be based upon a survey of the ECC improvement scheme timings, rather than rely upon the timings observed in the 2018 survey. It was noted also that ECC would be able to fine-tune signals timings on-site, once the mitigation scheme had been installed.

14 It was noted that the proposed mitigation scheme provides a significant wider public benefit to users of the highway network in Stansted Mountfitchet, particularly traffic using the Grove Hill signals. With particular regard to westbound traffic at Grove Hill, the mitigation scheme not only mitigates the impact of the proposed Elsenham development but it also mitigates the impact of all committed development schemes in the local area. The proposed mitigation scheme reduces predicted westbound queuing arising from committed sites and the proposed Elsenham development to present day levels.

15 In light of the above, ECC gave their cautious in principle approval to WSP's proposed mitigation measures. However, in order to give their full approval, ECC require full details of the 2018 traffic survey results, details of the modifications carried out to the Stansted Mountfichet microsimulation model and details of the modelling undertaken in support of the development of the mitigation scheme.

Action: WSP to provide ECC with a copy of the microsimulation model and copies of the modelling assessment results.

16 ECC stated that it was their intension to submit the revised model to their consultants for review.

17 WSP agreed to prepare a supplement to their 2017 Transport Assessment report. The supplement would pull together the model information described above and other information issued to both ECC and Highways England since the planning application submission in December 2017. The supplement will be issued to Uttlesford DC via David Lock Associates.

Action: WSP to prepare a supplement to the 2017 Transport Assessment.

18 ECC confirmed that they had been involved in discussions to scope the transport assessment for the West of Hall Road planning re-application. ECC confirmed that the applicant's consultants would be expected to take account of the Elsenham development in their transport assessment. ECC require a similar level of transport analysis/ assessment as produced by WSP for the Elsenham site.

Post-meeting note

Tony Fitch (ECC) provided the following comments in his email dated 7th December 2018;

Thank you for providing the meeting notes. We have two issues we would like to raise:

We acknowledge that the Grove Hill secondary queue failing to clear within the green time can occur in both peaks but is a more significant problem in the AM peak. Whilst we are happy with the principle of additional detection to mitigate this problem our position is that in the PM peak, when the dominant flow is from Lower Street heading northeast, the detection should not disadvantage this flow such that it causes longer queues and additional delays in view of the limited capacity/queuing space engendered by the current road layout. This may mean enabling/disabling the secondary queue detection by timetable.

With regard to Point 13 on the minutes we stated at the meeting that we expect to undertake some validation of the signal timings as part of the improvement measures we are delivering early next year. However, the fine-tuning associated with the mitigation scheme would need to be undertaken by yourselves with Essex Highways role being to oversee and accept these works.

GCC/05 Dec 2018

Revised 10th Dec 2018

Appendix F

MICROSIMULATION MODELLING TECHNICAL NOTE 03 REV C

TECHNICAL NOTE 03

DATE:	23 January 2019	**CONFIDENTIALITY:**	Confidential
SUBJECT:	Stansted Mountfitchet Microsimulation Modelling – Revision C		
PROJECT:	Land East of Elsenham	**AUTHOR:**	Eduardo Carbajo Fuertes
CHECKED:	Sian Loveday	**APPROVED:**	Gerry Corrance

1. Introduction

1.1. This Technical Note has been prepared by WSP to detail the process that was undertaken to assess the likely impact of the traffic generated by the development of the “Land East of Elsenham” on the highway network in Stansted Mountfitchet.

1.2. Stansted Mountfitchet is a rural village in Uttlesford, Essex which is located between Elsenham and Bishop’s Stortford on land adjacent to the M11. The proposed residential development site (“Land East of Elsenham”) is situated 2 miles east of Stansted Mountfitchet, as shown in Figure 1. The proposed development is likely to increase the number of vehicle trips routing into and through Stansted Mountfitchet due to its location on the route between Elsenham and Bishop’s Stortford.

1.3. The main route through Stansted Mountfitchet is the B1051 which comprises a number of junctions and sections of carriageway where on-street parking is common and has the potential to restrict flows, predominantly on Chapel Hill and also on Grove Hill, just north of the Lower Street traffic lights. The performance of the existing junctions and the presence of on-street parking is known to impact the operation of the local road network and therefore, it is important that these constraints are taken into account within this assessment.

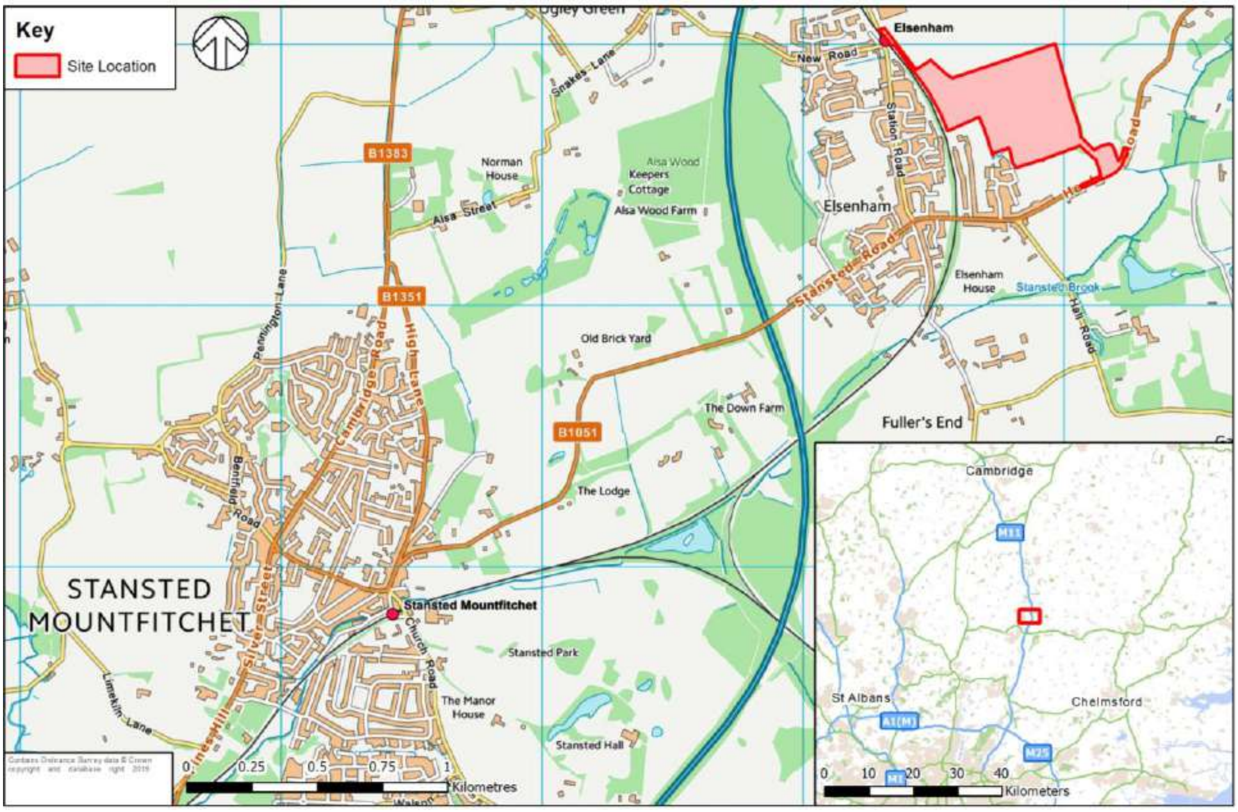


Figure 1 –Location plan

2. Methodology

2.1. It is important to capture the complexities of the give-way behaviour that is required to navigate narrow sections with on-street parking in this assessment as it governs the level of throughput that can be achieved. In order to accurately assess the impact of the on-street parking, the production of a VISSIM microsimulation model is required as this gives the flexibility to calibrate the overtaking / parking behaviour as observed on-street. A microsimulation model can assess both link and junction performance and is able to capture the complexities associated with the on-street parking / overtaking behaviours that have been observed in the study area.

2.2. The VISSIM microsimulation model also allows for the correct representation of the traffic signal controller at Grove Hill, as it is able to accurately model the vehicle actuated strategy that operates the signals. Moreover, the model is able to assess the close interaction between the signals and the on-street parking at Grove Hill, which is one of the key constraints of Stansted Mountfitchet.

2.3. When setting up a micro-simulation model it is standard practice to initially build a base model to represent current network conditions. This allows the modeller to compare the model outputs to on-street observations and, if they compare well, gives confidence that the model is fit for purpose and therefore can be relied upon to predict future conditions. This process is known as calibration and validation of the model and is the first step described in this Technical Note.

2.4. Following successful base model validation, this Technical Note then describes the subsequent forecast year testing that was undertaken which assessed the impact of the additional vehicle trips predicted to be generated by committed developments as well as the proposed 350-unit residential development at Elsenham. The scenarios assessed within this Technical note are listed in Table 1.

Table 1 – Model scenarios

SCENARIO	DESCRIPTION
2018 Base Year	Validated base year model
2023 Reference Case	Validated base year model + 2023 committed developments
2023 With Development	Validated base year model + 2023 committed developments + "Land East of Elsenham" development

3. Model Scope

3.1. A micro-simulation model is the most appropriate tool to model the operation of the B1051 through Stansted Mountfitchet as it can replicate both the existing junction operations as well as the impact of on-street parking on reduced traffic speeds and single file working. The 2018 base model scope has been developed with this in mind, and includes the following:

- All key routes that are likely to receive traffic from the proposed development – Grove Hill, Lower Street, Church Road, Chapel Hill, Cambridge Road, Silver Street and Bentfield Road;
- Both the AM and PM peak periods, identified based on observed data;
- On-street parking on Chapel Hill and Grove Hill: the model incorporates the behaviour of drivers overtaking parked cars as observed in these locations;
- The zebra crossings on Chapel Hill; and
- Vehicle interaction at the following junctions;
    - Lower Street / Grove Hill: the model includes the VA signal controller currently operating the junction;

- Chapel Hill / Church Road / Lower Street / Station Road; and
- Bentfield Road / Silver Street / Chapel Hill.

4. Data Collection

4.1. A data collection exercise was undertaken by 360 TSL (Paul Castle) on Wednesday 27th June 2018 and on Wednesday 04th July 2018, including classified turning counts, automatic traffic counts, queue lengths, journey times, on-street parking bay occupation and signal timings analysis. The location of the different data collection points is shown in Figure 2.

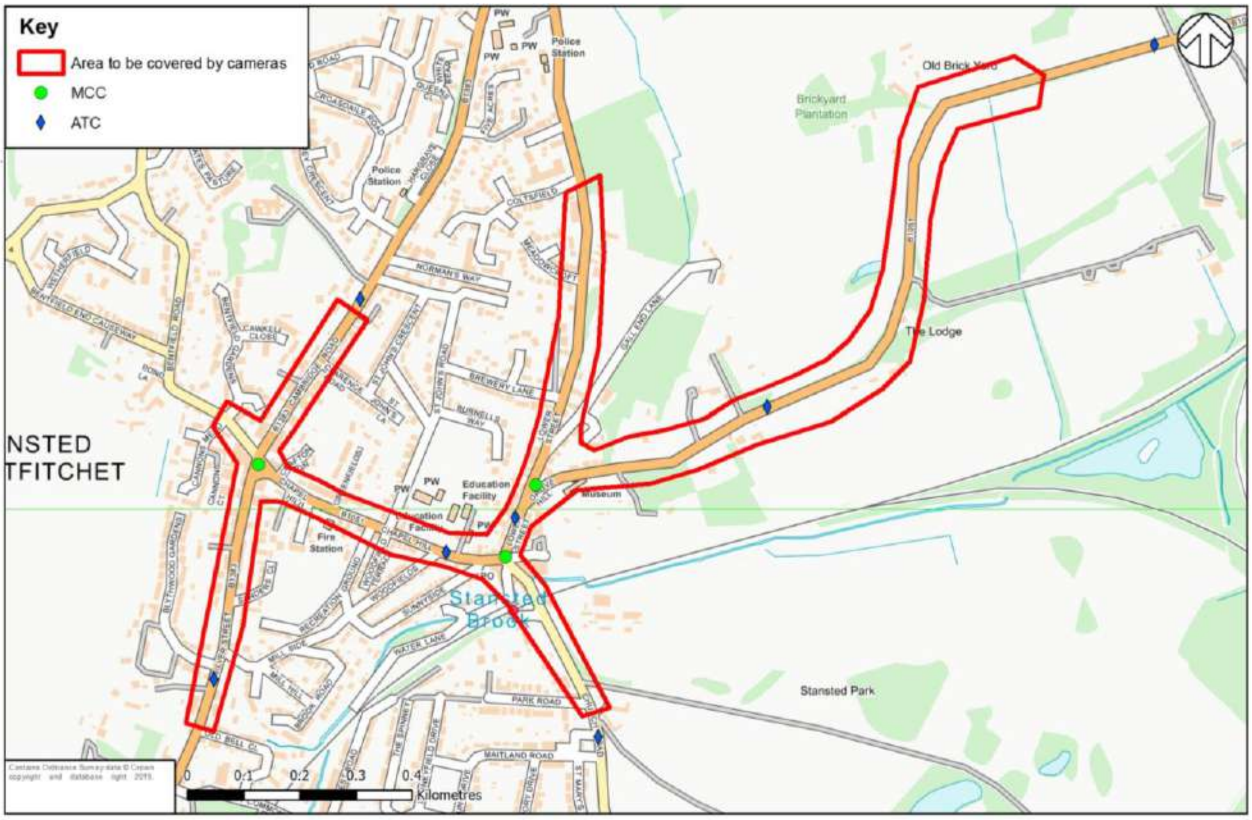


Figure 2 – Data collection

4.2. On Wednesday 4th July 2018, the on-street parking bays on a section of Chapel Hill in Stansted Mountfitchet were coned off during the AM peak in preparation for new white-line painting, thus removing one of the existing flow constraints through Stansted Mountfitchet. The data from 4th July was therefore disgarded and survey data from 27th June 2018 has therefore been the basis for the microsimulation modelling.

4.3. Details of all data sources used to build the 2018 base model are covered in the following sections.

Traffic Flow Data

4.4. Manually classified turning counts were conducted at three junctions in Stansted Mountfitchet. Turning flows at each location were collated in 15-minute intervals from 07:00-10:00 hours and 16:00-19:00 hours. Vehicles were classified into seven categories; Car, Light Goods Vehicle (LGV), OGV1 (Smaller HGV), OGV2 (Larger HGV), Bus / Coach, Motorbike and Bicycle.

4.5. Data from the following three survey sites was used to inform flows for the 2018 base model:

- Site 4) Lower Street / Grove Hill;
- Site 5) Chapel Hill / Church Road / Lower Street / Station Road; and

- Site 10) Bentfield Road / Silver Street / Chapel Hill.

4.6. Analysis of the observed traffic count data confirmed that the periods of peak traffic flow in Stansted Mountfitchet are 08:00-09:00 and 17:00-18:00. It is best practice to model the worst case in terms of traffic flows to ensure a robust assessment is made and therefore these hours were selected for the 2018 base model. A network flow diagram for the AM and PM is provided in Appendix A.

Queue length data

4.7. Queue length surveys were also conducted at the same three junctions in Stansted Mountfitchet. Queue lengths in vehicles were collated in 5-minute intervals from 07:00-10:00 hours and 16:00-19:00 hours for each entry lane at the junctions.

4.8. Data from the following three survey sites was used to calibrate the 2018 base model:

- Site 4) Lower Street / Grove Hill (including secondary queue on Grove Hill);
- Site 5) Chapel Hill / Church Road / Lower Street / Station Road; and
- Site 10) Bentfield Road / Silver Street / Chapel Hill.

Travel time data

4.9. Travel times through Stansted Mountfitchet were obtained from video footage collected on the same day as the traffic flow and queue length data. The journey times were recorded for the peak hours (08:00 – 09:00 and 17:00 – 18:00) with a sample size of 60 measurements per hour for each journey time section (see Figure 6).

Signal timings data

4.10. The start and end times for each traffic signal phase at the Grove Hill traffic signals were recorded during the AM and PM peak periods (07:00-10:00 and 16:00-19:00) on the same days that the turning count data was collected. This data was initially used to configure a vehicle actuated signal controller in the 2018 base model that allowed variable green times to run in line with the level of demand.

4.11. The operation of the modelled signal controller was further refined using information from the signal controller specification and clarifications from Essex County Council who are responsible for the maintenance and operation of the signals.

Site observations

4.12. Observations relating to the operation of the on-street parking and zebra crossings were made using the video footage to ensure a detailed understanding was gained on their impact on the existing operation of the B1051 through Stansted Mountfitchet. These observations helped to capture the capacity impacts of both the existing crossings and on-street parking allowing on-street behaviours to bereplicated in the 2018 base model. The following observations were made:

- The number of pedestrians using the zebra crossings on Chapel Hill was monitored to determine the level of interaction between pedestrians and vehicles that should be replicated by the model. Very low numbers of pedestrians were witnessed using the crossings during the surveys. If the number of pedestrians crossing were to increase (or if numbers were low on the day of the surveys) then the number and size of gaps between vehicles would mean that pedestrians could still cross with little impact to vehicles. For this reason, the crossings were not included in the model as the overall impact of them was deemed to be negligible;
- Parked cars on Chapel Hill generally remained parked for the entire peak hour. Drivers using Chapel Hill are clearly familiar with the obstruction created by the parked cars and often drivers will allow oncoming vehicles to proceed even if it is not their right of way. This courteous behaviour is key to ensuring that traffic is able to flow on Chapel Hill;

- Parked cars on Grove Hill, just north of the traffic lights have the potential to block the carriageway, but drivers in the area appear to be aware of this and ensure that queues at the southbound signal allow a gap for northbound vehicles to overtake the cars parked in the northbound lane. This courteous / yellow-box style behaviour is key to the successful operation of the traffic lights in this area;
- Parked cars on both sides of Lower Street, between the Queen's Head pub and the point where Grove Hill and Lower Street diverge restrict throughput as available road space is effectively narrowed. Vehicles are not forced to overtake parked cars as there is space for two moderately sized vehicles to pass each other, but vehicles are observed to slow down considerably;
- A similar narrowing / slowing effect was observed due to parked cars on both sides of Cambridge Road near the petrol station, just north of the Chapel Hill / Cambridge Road junction; and
- Southbound vehicles leaving the Grove Hill signals, heading towards the mini roundabout often overrun the northbound lane slightly, triggering the northbound signal detectors. Likewise, northbound vehicles are often detected by the southbound stage detectors. This results in the northbound and southbound green stages being called at times when no demand for the corresponding stage is present.

Bus timetables

4.13. Bus timetable was reviewed to ensure existing bus movements were included in the 2018 base model. The existing timetable information is summarised below:

- The bus service 7 / 7A runs from Stansted Airport to Bishop's Stortford approximately every 2 hours. It travels along Chapel Hill, eastbound to Stansted Airport and westbound to Bishops Stortford;
- The 301 service runs from Saffron Walden to Bishop's Stortford approximately once per hour. It travels northbound and southbound along the B1383 (Silver Street and Cambridge Road); and
- The 306 service runs from Wicken Bonhunt to Bishop's Stortford once in the morning and returns in the late afternoon, prior to the PM peak. In the morning it runs from Silver Street via Bentfield and then west to Bishops Stortford.

4.14. Bus service frequencies during the modelled hours (08:00-09:00 and 17:00-18:00) are shown in Table 2.

Table 2 - Existing Bus Frequencies: Stansted Mountfitchet

ROUTE	TIME PERIOD	DIRECTION	BUSES PER HOUR
7 /7A	AM Peak (08:00-09:00)	Eastbound	1
		Westbound	0
	PM peak (17:00-18:00)	Eastbound	1
		Westbound	1
301	AM Peak (08:00-09:00)	Northbound	0
		Southbound	1
	PM peak (17:00-18:00)	Northbound	1
		Southbound	1
306	AM Peak (08:00-09:00)	Northbound	0
		Southbound	1
	PM peak (17:00-18:00)	Northbound	0
		Southbound	0

5. Base Model Development

5.1. The 2018 base model road network was produced using aerial imagery and a general arrangement layout plan of the new mini roundabout which has recently been constructed at the eastern end of Chapel Hill. The extent of the model was produced in line with the area identified during the model scoping process (see Figure 3 below).

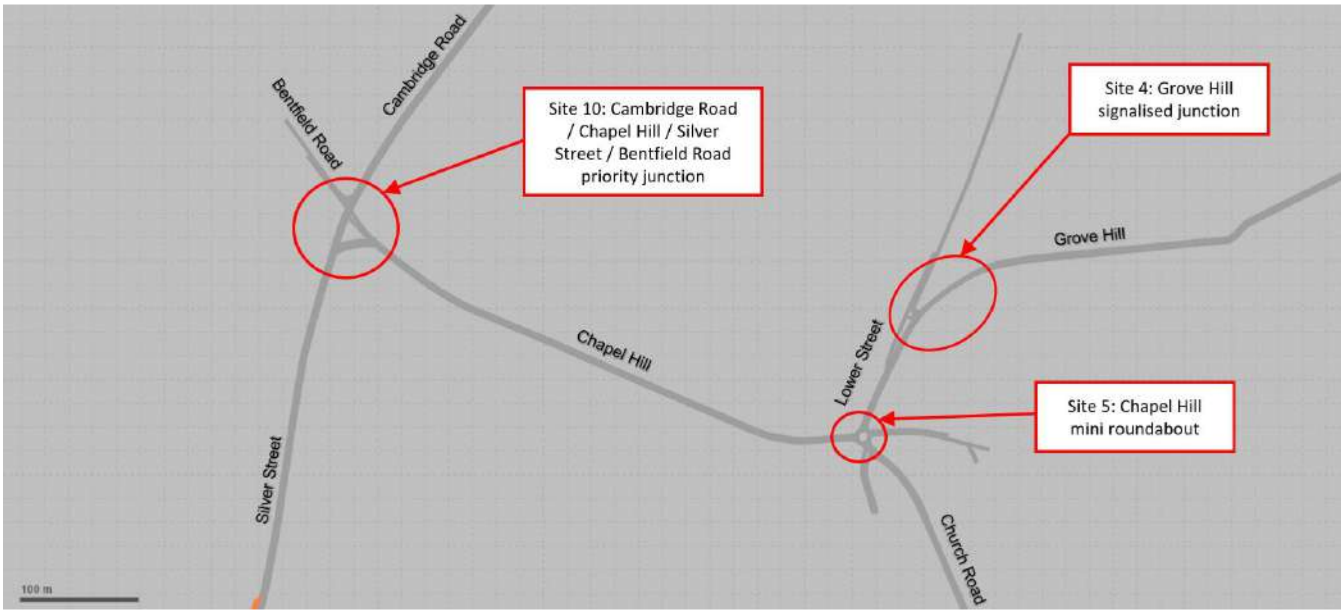


Figure 3 – Stansted Mountfitchet Model Extent

5.2. The following network controls were put in place to ensure that the modelled driving behaviour adequately represents the observed traffic behaviour:

- 30mph speed limits in all locations with the exception of the B1051 between Elsenham and Stansted Mountfitchet with a speed limit of 60 mph and the Castle and Station accesses which were reduced to 20mph zones. Speed distributions for each speed limit were taken from TfL's VISSIM model template[1]
- All turns at junctions were assigned a reduced speed area to ensure that vehicles are able to navigate their way around the network at a realistic speed. Priority rules and conflict areas were defined at all junctions where give way behaviour is present;
- The sections of Cambridge Road and Lower Street that are subject to a narrowing of the carriageway width due to on-street parking were assigned reduced speed areas to replicate the observed low vehicle speeds through these sections of road;
- The shuttle working traffic signals on Grove Hill were included in the model and were set up for both the AM and PM peak. TfL's VA VAP template was used to create the modelled signal controller. This template allows any vehicle actuated junction to be accurately represented in VISSIM providing that site-specific parameters from the on-street signal controller are provided as an input. Minimum and maximum green times, extensions, intergreens, etc. were obtained from the signal specification provided by ECC. Detectors were placed on the network based on aerial images and plans provided by ECC;

5.3. Vehicles were input into the base model in 15-minute intervals in two distinct layers; light vehicles (cars, LGVs and motorbikes) and heavy vehicles (OGV1, OGV2 and buses). This was done to ensure the distribution of heavy vehicles throughout the network was realistic. The composition of vehicles within the light and heavy layers was based on observed totals as shown in Table 3.

[1] Paragraph 5.3.2.2 at http://content.tfl.gov.uk/traffic-modelling-guidelines.pdf

Table 3 – Vehicle composition

		AM	PM
Light	Car	86%	90%
	LGV	13%	9%
	Motorbike	1%	1%
Heavy	OGV1	63%	75%
	OGV2	27%	2%
	Bus	10%	23%

5.4. Vehicles were colour-coded in the model based on their corresponding layer of traffic to facilitate its interpretation. The colour scheme used in the model is explained in Table 4.

Table 4 – Vehicle colour scheme

TRAFFIC LAYER	COLOUR
Base year	Blue
Committed Developments	Red
Proposed Development	Green
Parked Cars	Yellow / White

5.5. On-street parking was explicitly modelled on Chapel Hill and Grove Hill. Parked vehicles arrive in the on-street parking bays during the model warm-up period and are assumed to remain parked for the entirety of the core modelled hour, in line-up with on-site observations. Overtaking in the opposing lane was permitted on links where on-street parking has been included. A number of priority rules have been placed on both the impeded (side with parking) and the non-impeded side of the road which instruct vehicles when they should give way to the opposing flow.

5.6. These rules work as follows on Chapel Hill:

- If an eastbound vehicle has entered the on-street parked cars section (location 1 in Figure 4), the westbound vehicles will give way before the first parking bay (location C);
- If a westbound vehicle has entered the on-street parked cars section (location 2), the eastbound vehicles will give way before the first parking bay (location A).

5.7. These two rules effectively give priority to whichever vehicle gets first to the on-street parked cars section, as it was observed in the video footage. As vehicles from opposite directions might reach the parked cars section at the same time and proceed, additional priority rules have been set up in the middle section between the parking bays:

- If an eastbound vehicle has entered the on-street parked cars section (location 1), the westbound vehicles between both parking bays (location D) will give way;
- If a westbound vehicle is waiting between the two parking bays (location D), the approaching eastbound vehicles will give way (location A), despite technically having right of way (the courtesy behaviour observed during the site visit);
- If several westbound vehicles are waiting between the two parking bays (location D) then the upstream vehicles at the primary queue (location C) will stop to avoid blocking the section alongside the parked cars;

- If a westbound vehicle has entered the on-street parked cars section (location 2), the eastbound vehicles between both parking bays (location B) will give way; and
- If an eastbound vehicle is waiting between the two parking bays (location B) then the upstream vehicles at the primary queue (location A) will give way to avoid blocking the section alongside the parked cars.

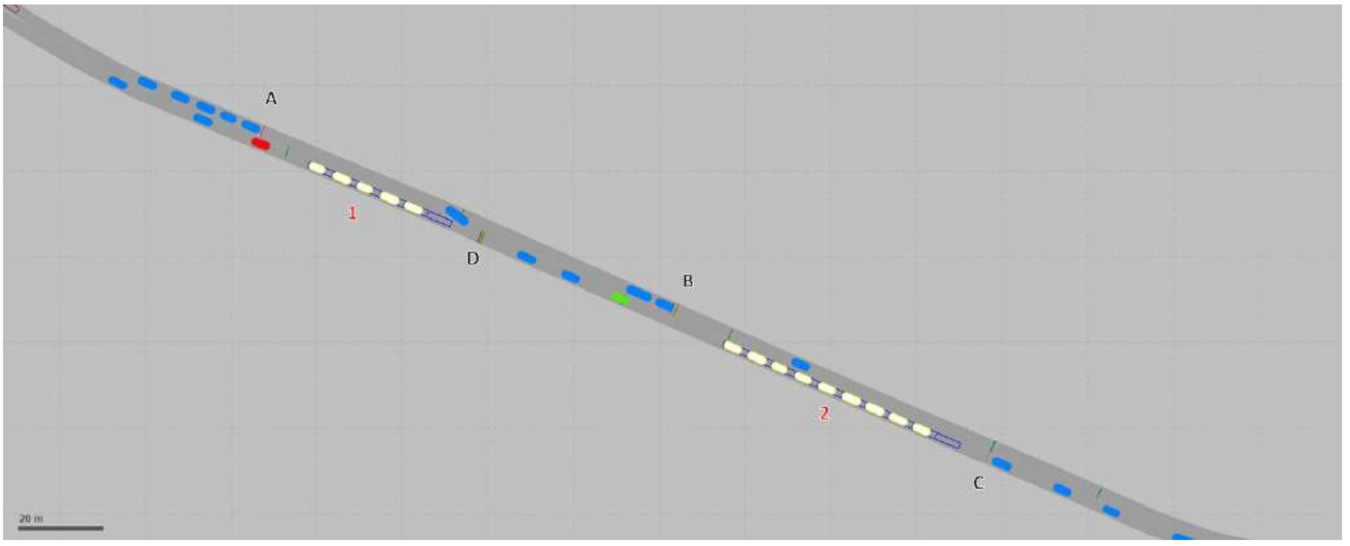


Figure 4 – Chapel Hill. Vehicles from opposite directions approached the on-street parking section at the same time. Eastbound vehicles give way at location B as there are westbound vehicles overtaking the parked cars at the eastern parking bay section (2). The vehicles at location A opt not to proceed as there are vehicles waiting at location B and they could block the western parking bay section, allowing vehicles at location D to continue.

5.8. The following priority rules have been applied on Grove Hill:

- If an eastbound vehicle is approaching or at the on-street parked cars section, the westbound vehicles will give way at the secondary queue (location B in Figure 5), despite technically having right of way;
- If a westbound vehicle is at the on-street parked cars section, the eastbound vehicles will give way (location C); and
- If a westbound vehicle is found between the stopline (location A) and the secondary queue (location B) while the signal for the southbound stage is red, the following non-impeded vehicle will stop at the secondary queue (location B). Drivers were observed to treat this area as they would a yellow box marking, opting to leave the southbound lane clear so that northbound traffic was not blocked from overtaking the parked cars, allowing it to clear the traffic lights.

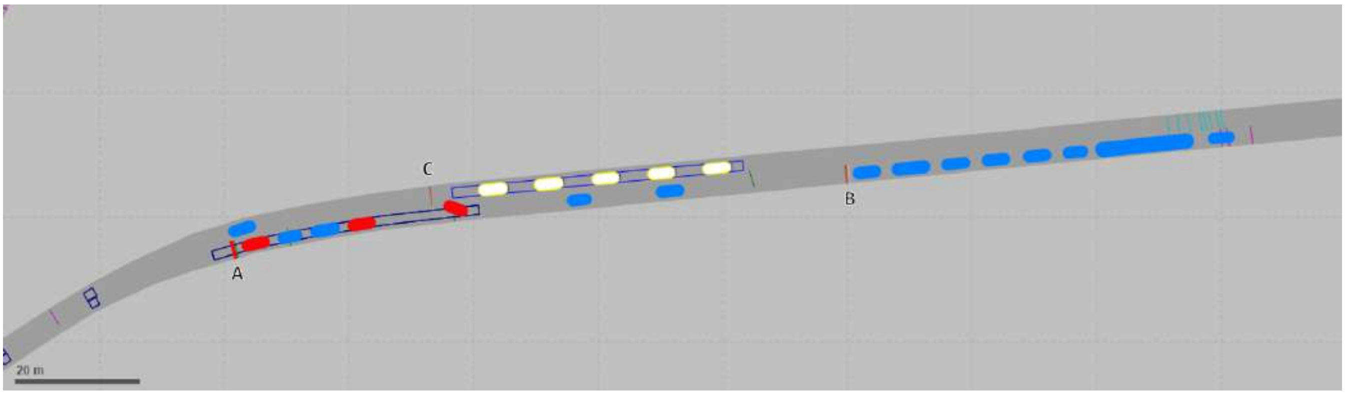


Figure 5 – Southbound traffic signal at Grove Hill. Westbound vehicles observe "yellow-box" style behaviour and opt not to queue alongside the parked cars (white vehicles). This allows the eastbound vehicles to overtake the parked cars and avoid queuing back into the signal controlled area.

5.9. The driving behaviour on the Grove Hill approach was analysed from video footage and replicated in the model in detail. The video footage revealed two different behaviours depending on the level of congestion at the approach. During the AM peak, due to higher levels of congestion drivers are, in general, more hesitant to go through the on-street parking section and hence the headway between vehicles is significantly longer than usual. During the PM peak, the level of congestion is lower and vehicles do not hesitate as much. The headway between vehicles in this case remains more comparable to the rest of the network and thus has not been modified in the model.

6. Results of Base Model Calibration and Validation

6.1. The AM and PM peak hour base models were both compared against observed flow, queue and travel time data to ensure they were replicating on-street behaviour. The following section presents this comparison and demonstrates that the base models are able to replicate observed conditions and meet the Department for Transport (DfT) validation criteria.

6.2. The validation criteria set used was based on DfT guidelines set out in TAG Unit M3.1 Highway Assignment Modelling.

Turning Flow Calibration

6.3. The modelled junction turning flows were compared against observed counts using the GEH statistic as prescribed in WebTAG and summarised below.

$$GEH = \sqrt{\frac{(M-C)^2}{(M+C)/2}}$$

where: GEH is the GEH statistic;

M is the modelled flow; and

C is the observed flow.

6.4. Traffic flow validation was confirmed using the criteria set out in Table 5.

Table 5 - Traffic Flow Validation Criteria (source: TAG Unit 3.1)

Table 2 Link Flow and Turning Movement Validation Criteria and Acceptability Guidelines		
Criteria	Description of Criteria	Acceptability Guideline
1	Individual flows within 100 veh/h of counts for flows less than 700 veh/h	> 85% of cases
	Individual flows within 15% of counts for flows from 700 to 2,700 veh/h	> 85% of cases
	Individual flows within 400 veh/h of counts for flows more than 2,700 veh/h	> 85% of cases
2	GEH < 5 for individual flows	> 85% of cases

6.5. Table 6 and Table 7 demonstrate that all of the modelled turning flows closely match those observed in both the AM and PM peak hours. All turns achieve a GEH of less than 1 which is better than the DfT criteria of less than 5. All observed turning flows are less than 700 vehicles per hour and are therefore subject to the ‘within 100 vehicles’ criteria which they all pass.

Table 6 – AM peak flow calibration statistics

	GEH STATISTICS - AM			INDIVIDUAL FLOWS		
	GEH < 5	GEH < 6	GEH < 10	f < 700	700 < f < 2700	f > 2700
Calibration	100.0%	100.0%	100.0%	100.0%	No Data	No Data

Table 7 – PM peak flow calibration statistics

	GEH STATISTICS - PM			INDIVIDUAL FLOWS		
	GEH < 5	GEH < 6	GEH < 10	f < 700	700 < f < 2700	f > 2700
Calibration	100.0%	100.0%	100.0%	100.0%	No Data	No Data

6.6. Table 6 and Table 7 both demonstrate that the modelled junction turning flows calibrate well against observed data in both time periods which would be expected as the observed flows are being directly input into the model.

6.7. Full turning flow calibration data is provided in Appendix B.

Travel Time Validation

6.8. Travel times from the model were compared against observed travel times using the criteria set out in Table 8.

Table 8 - Journey Time Validation Criteria (source: TAG Unit M3.1)

Table 3 Journey Time Validation Criterion and Acceptability Guideline	
Criteria	Acceptability Guideline
Modelled times along routes should be within 15% of surveyed times (or 1 minute, if higher than 15%)	> 85% of routes

6.9. Table 9 and Table 10 demonstrate that compared to the DfT journey time validation criteria, both (100%) of the travel time routes fall within +/- 15% of the observed time which therefore means both base models validate against observed data.

Table 9 - AM Peak Travel Time Analysis Summary

	TRAVEL TIME (SECONDS)			
	OBSERVED	MODELLED	DIFF	%DIFF
Westbound: B1051 (E) to Blythwood Gardens	225	229	4	+1.9%
Eastbound: Blythwood Gardens to B1051 (E)	199	186	-13	-6.8%

Table 10 - PM Peak Travel Time Analysis Summary

	TRAVEL TIME (SECONDS)			
	OBSERVED	MODELLED	DIFF	%DIFF
Westbound: B1051 (E) to Blythwood Gardens	215	221	6	+2.9%
Eastbound: Blythwood Gardens to B1051 (E)	208	180	-28	-13.7%

6.10. The presence of traffic signals and also the modelled courtesy behaviour around parked cars can result in the modelled journey times being relatively variable, therefore achieving an acceptable level of validation against an observed average time is a good indication that the model replicates reality.

6.11. To give further confidence that the 2018 base model is able to replicate observed conditions, a more detailed journey time validation exercise has been undertaken. The eastbound and westbound routes presented above were disaggregated into sub-sections (see Figure 6) to allow the model to be validated in more detail. The modelled and observed travel times are compared in more detail in Table 11 and Table 12.

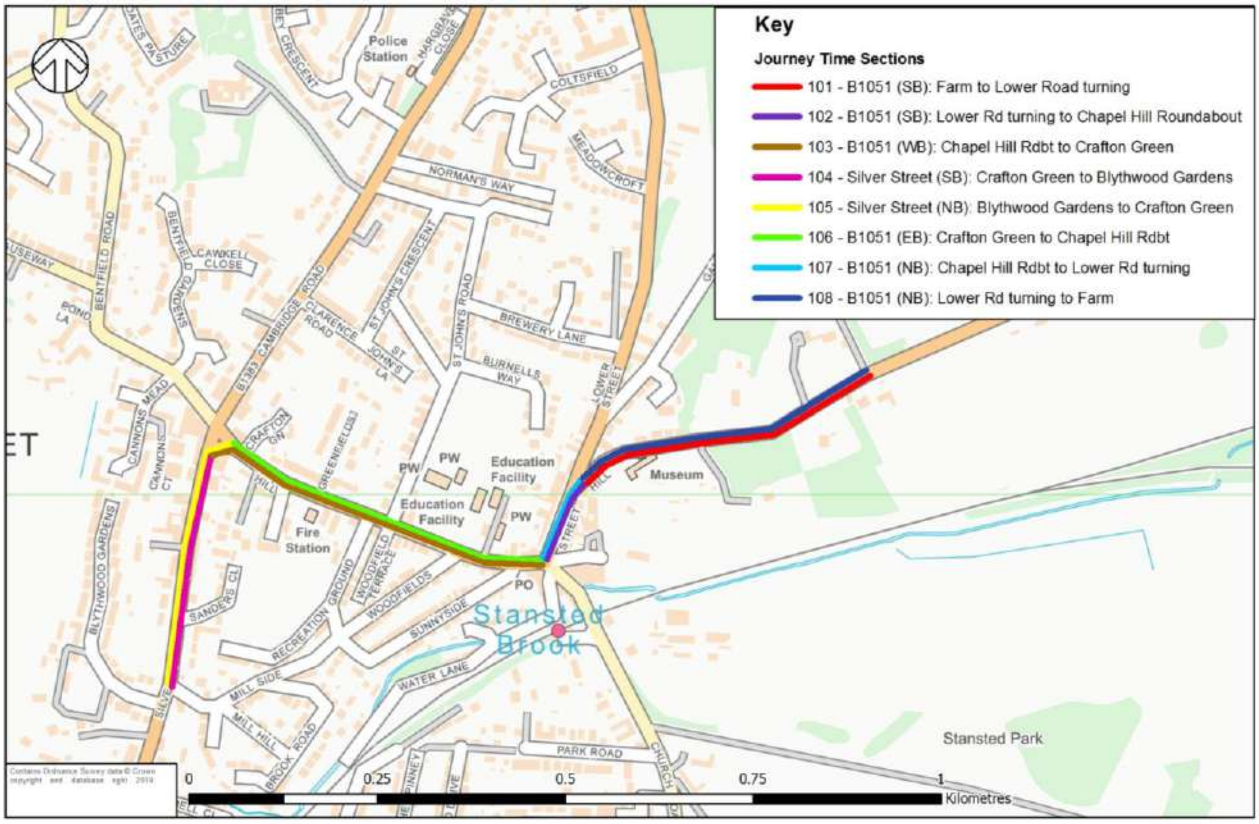


Figure 6 – Travel Time Sub-sections

6.12. Table 11 demonstrates that the travel time sub-sections compare well against observed times. In the AM model, 88% of the travel time sub-sections fall within 15% of the observed time. This meets the WebTAG criteria of ‘more than 85%’.

Table 11 - AM Peak Detailed Travel Time Analysis

TRAVEL TIME ROUTE, SUB-SECTION	TRAVEL TIME (S)		MODELLED VS OBSERVED	
	OBSERVED	MODELLED	DIFF	% DIFF
101 - B1051 (SB): Farm to Lower Road turning	110	108	-2	-1.7%
102 - B1051 (SB): Lower Rd turning to Chapel Hill Roundabout	18	19	1	5.2%
103 - B1051 (WB): Chapel Hill Rdbt to Crafton Green	68	73	5	6.9%
104 - Silver Street (SB): Crafton Green to Blythwood Gardens	29	30	1	1.8%
105 - Silver Street (NB): Blythwood Gardens to Crafton Green	47	41	-6	-13.7%
106 - B1051 (EB): Crafton Green to Chapel Hill Rdbt	69	73	4	5.4%
107 - B1051 (NB): Chapel Hill Rdbt to Lower Rd turning	43	32	-11	-24.5%
108 - B1051 (NB): Lower Rd turning to Farm	40	40	0	-0.7%

6.13. In the PM model, 37.5% of the travel time sub-sections fall within 15% of the observed time. Of the five sub-sections that do not fall within 15% of the observed travel time, all five fall within 21% of the observed travel time. As the travel time sub-sections are all short, achieving a modelled time within 15% of the observed is challenging as this often means being with 5-10 seconds of the observed time.

Table 12 - PM Peak Detailed Travel Time Analysis

TRAVEL TIME ROUTE, SUB-SECTION	TRAVEL TIME (S)		MODELLED VS OBSERVED	
	OBSERVED	MODELLED	DIFF	% DIFF
101 - B1051 (SB): Farm to Lower Road turning	82	97	15	18.5%
102 - B1051 (SB): Lower Rd turning to Chapel Hill Roundabout	20	17	-3	-13.6%
103 - B1051 (WB): Chapel Hill Rdbt to Crafton Green	88	77	-11	-12.4%
104 - Silver Street (SB): Crafton Green to Blythwood Gardens	25	30	5	18.3%
105 - Silver Street (NB): Blythwood Gardens to Crafton Green	56	45	-11	-19.9%
106 - B1051 (EB): Crafton Green to Chapel Hill Rdbt	85	68	-17	-20.1%
107 - B1051 (NB): Chapel Hill Rdbt to Lower Rd turning	30	25	-5	-15.1%
108 - B1051 (NB): Lower Rd turning to Farm	37	41	4	11.5%

6.14. Focussing on the absolute difference between modelled and observed travel times demonstrates that the two compare favourably. The largest difference can be seen in section 106 where the modelled time is slightly underestimated by 17 seconds. Section 106 contains the Chapel Hill parked cars, which cause a significant amount of journey time variability in this area of the network. If a vehicle arrives when no vehicles are approaching on the opposite direction it may have a relatively short travel time whilst the opposite can result in a much longer travel time. An average travel time through this section is therefore highly sensitive to when vehicles arrive to each approach of the parked cars section. Achieving a modelled travel time within 21% of the observed travel time in such a variable location is therefore deemed to be a good indication that the model is able to replicate observed conditions.

6.15. Overall, the modelled travel times compare well to observed times which gives confidence that the model is able to replicate observed conditions.

Queue Length Validation

6.16. Queue lengths from the model have been compared against observed queue lengths in 5-minute intervals. The modelled queue lengths represent the maximum queue length occurring within each 5-minute interval. There are no formal queue length validation criteria prescribed by industry guidance, but in general the length, variability and profile of modelled queues throughout the hour should match observations.

6.17. The observed and modelled queue lengths have been compared in 5-minute intervals. It is expected that modelled queue lengths will be less variable than the observed queues as modelled flows have been input in 15-minute intervals whereas the vehicle arrival rate on street will be entirely random. We would expect modelled queue lengths to be more stable, as the arrival rate of traffic should be more consistent within each 15-minute input period. Generally this is the case when comparing the modelled and observed queues.

6.18. It should be noted that observed queue length data is particularly susceptible to human error. A VISSIM model is able to accurately monitor the maximum length of a queue to the nearest centimetre based on a pre-defined definition of what constitutes a queue. In the case of VISSIM, the default definition of a queue is a string of vehicles no more than 20m apart who are travelling less than 3.1mph and not subsequently above 6.2mph. The observed data cannot possibly be recorded to this level of precision because it is not possible for a human observer to achieve. Also, for a human observer, the definition of a queue is extremely subjective so is likely to vary between observers.

6.19. Full queue length validation data is provided in Appendix B.

Grove Hill signal controller validation

6.20. The signals at Grove Hill are one of the key constraints at Stansted Mountfitchet and thus it is fundamental that the modelled signal controller operates as it does on-street as this will define the level of throughput that the junction can accommodate.

6.21. Modelled green time distributions for the northbound and southbound stages of the Grove Hill signal controller have been compared against observed green time distributions. Even though there are no formal signal controller validation criteria prescribed by industry guidance, the green times of both stages should generally follow a similar distribution to the observed data if the model is considered to be well calibrated.

6.22. The distribution of green time lengths is closely related to the arrival pattern of vehicles. The arrival rate of vehicles in the model is randomised but specified in such a way that the total number of vehicles arriving within each 15-minute interval will match the observed totals. In other words, the modelled vehicle flows match the observed flows in terms of volume but not necessarily arrival rate within each 15-minute period. It would therefore be unrealistic to expect the distribution to perfectly match the observed distribution but a similar pattern would be expected.

6.23. Figure 7 shows the green time distribution for the northbound and southbound stages during the AM peak. The observed data shows that the southbound stage mainly runs very short or very long (at or close to maximum) greens, with very few medium length green times.

6.24. This is a result of the courtesy behaviour observed at this location, where southbound vehicles approaching Grove Hill will give way to the northbound traffic overtaking the area of parked cars approximately 100m upstream of the stopline. By the time the vehicles giving way at the secondary queue can proceed, they are not able to reach the detection range within the allotted extension time meaning the stage will 'gap-change' to the next stage. A gap change occurs when no vehicles are detected on approach to the junction for a number of seconds (the extension time).

6.25. There are occasions when the vehicles giving way at the secondary queue are able to reach the detection range before the extension time has been exceeded. In this instance the southbound stage will be extended until a gap in flow is detected. As a number of queued vehicles are present in the secondary queue there are few gaps and the stage is therefore likely to run to its maximum green. The graphs show that the model replicates this pattern of very short and very long green times for both stages.

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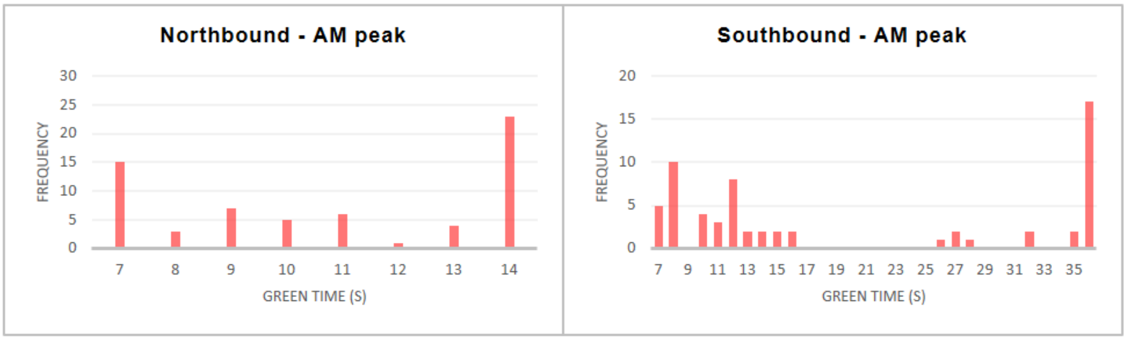

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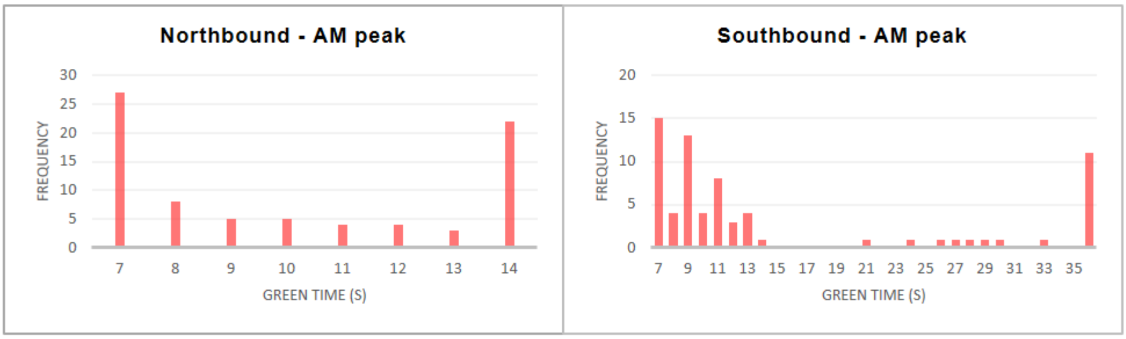

Figure 7 – Grove Hill signal green time distribution – AM Peak

6.26. Figure 8 shows the green time distribution for the northbound and southbound stages during the PM peak. The graphs show that the model replicates the operation of the signal controller for both stages.

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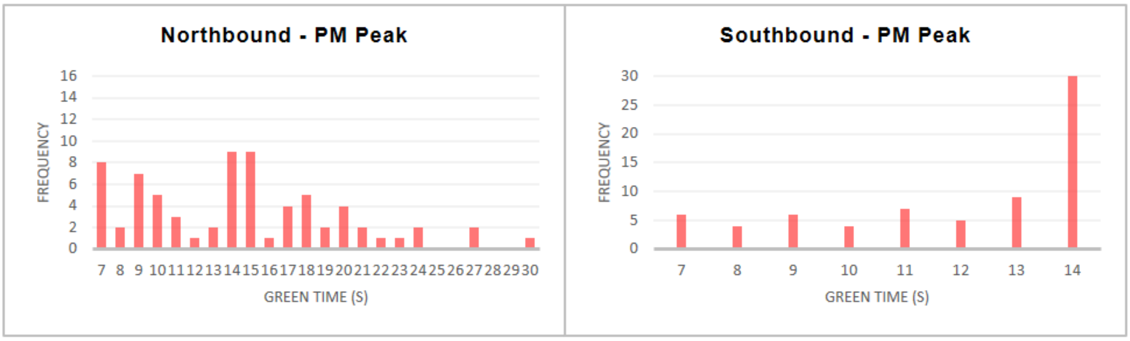

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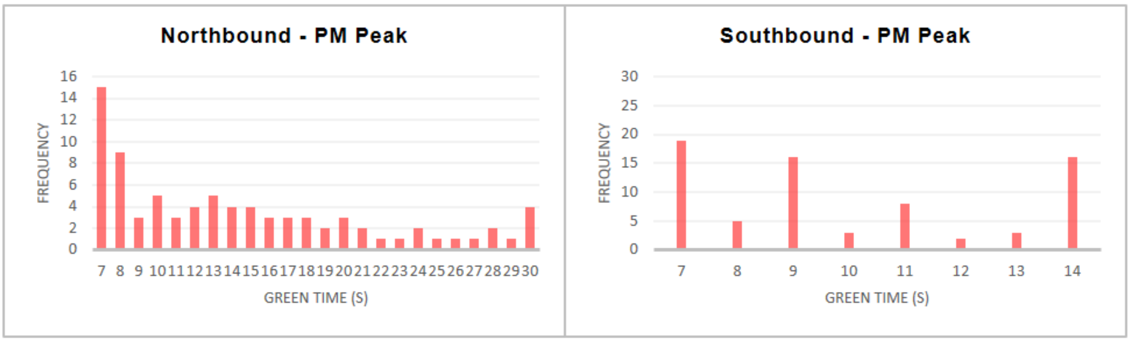


Figure 8 - Grove Hill signal green time distribution – PM Peak

Validation Summary

6.27. Overall, the modelled flows, journey times, queues length and green time distributions compare well to those observed and therefore it is concluded that the 2018 base model is able to independently replicate observations and is therefore fit for forecasting. The model provides a good representation of the existing operation of the B1051 through Stansted Mountfitchet, against which the impact of additional committed development and the proposed development vehicle trips can be assessed.

7. Model Forecasting

7.1. The validated base model has been used as a basis for producing a forecast of traffic conditions in Stansted Mountfitchet for an assessment year of 2023. The forecast includes calculation of traffic associated with committed development sites in the vicinity of Stansted Mountfitchet and Elsenham. To avoid double counting, Tempro growth has not been applied to the 2023 traffic forecast.

Committed Development Trips

7.2. The location and anticipated build-out of committed development sites (local to Elsenham and Stansted Mountfitchet) has been identified using information published by Uttlesford District Council. The Transport Assessment report details the committed sites that have been taken into account. The vehicle trip generation for each committed development site has been assessed and then assigned to the local highway network, including to the B1051 and routes through Stansted Mountfitchet.

7.3. The identified committed development sites result in an extra 329 vehicular trips being added to the AM peak base model and 326 extra trips being added to the PM peak base model respectively. The majority of these trips have been assigned to Lower Street, Chapel Hill and Silver Street (on the route to/from Bishop's Stortford).

Proposed Development Trips

7.4. As described in TN01, previously agreed vehicle trip rates have been used to assess the total number of development related vehicular trips. These vehicle trips have then been distributed based on Journey to Work data from the 2011 Census (to determine where development trips are likely to go) and then assigned to routes to each destination using Google Maps and Trafficmaster journey time data (to determine which routes trips are likely to take).

7.5. The proposed development is predicted to result in a total of 96 vehicular trips being added to the Stansted Mountfitchet road network in the AM peak and 96 vehicle trips being added to the Stansted Mountfitchet road network in the PM peak respectively. The majority of these additional vehicle trips have been assigned to Silver Street and Grove Hill (route from Bishop's Stortford), as per the committed development assignment.

8. Forecast Model Results

8.1. VISSIM is a stochastic micro-simulation modelling package and therefore is able to take into account the differences caused by small changes in vehicular arrival rates, desired speeds, vehicle dwell times and accelerations amongst other factors that occur within the daily variation of traffic flows. When a single model run is conducted, a random seed is selected which governs the randomly assigned elements of the model. A different random seed can result in different outcomes for the same model due to the variation of these small random elements.

8.2. Ultimately the level of flow will remain roughly the same between runs but the arrival pattern and other random elements will vary. For this reason, it is best practice to conduct a number of VISSIM model runs, each using a different random seed. This gives the modeller an opportunity to ascertain how sensitive the model is to small variations and also means any results can be averaged for all runs to provide an average outcome rather than rely on the results of a single run (single random seed) which could be particularly better or worse.

8.3. A total of 20 simulation runs were conducted for each of the model scenarios. Two simulation runs in the AM peak (random seeds 8 and 10) and one in the PM peak (random seed 18) were excluded from the analysis as some of the driving behaviour observed during the runs was deemed unrealistic due to modelling limitations. The main issue related to the way in which modelled vehicles are not reliably able to pre-empt the blocking of downstream sections of road. Local drivers were observed to consistently apply a courtesy behaviour to prevent gridlock from occurring in narrow areas of the network but vehicles in the model were not able to reliably do this due to their inability to predict outcomes before they've happened. Any runs where model limitations result in gridlock situations occurring have been excluded from the results analysis.

8.4. Three model scenarios have been set up for both the AM and PM peaks, and are summarised in Table 13.

Table 13 – Forecast Models

MODEL NAME	CODE (GRAPH LEGEND)	DESCRIPTION
2018 Base	2018	2018 validated base model
2023 Reference Case	2023+C	2018 base model + committed developments
2023 With Development	2023+C+D	2018 base model + committed developments + trips associated with 350-unit proposed development

Overall Network Performance Results

8.5. A number of network wide statistics have been extracted for the three models which indicate how the overall performance of the network compares between the three scenarios. The results presented below are the average of all runs for the full modelled periods.

Table 14 – Network Performance Model Results

NETWORK STATISITIC	AM PEAK			PM PEAK		
	2018	2023+C	2023+C+D	2018	2023+C	2023+C+D
Total Time (h)	75	109	134	75	110	140
Total Distance (km)	2,426	2,933	3,147	2,365	2,858	3,015
Total Vehicles	2,192	2,530	2,632	2,397	2,735	2,838
Total Delay (h)	22	45	66	22	46	73
Average Time (s) / Vehicle	123	154	183	113	144	178
Average Time (s) / Mile	179	214	247	184	222	269
Average Distance (m) / Vehicle	1,107	1,160	1,196	986	1,045	1,062
Average Speed (mph)	20	17	15	20	16	13
Average Speed (kph)	32	27	24	31	26	22
Average Delay / Vehicle (s)	37	64	90	33	60	92

8.6. The network wide statistics show that time, distance and delay increase with the number of vehicles in the network. The relationship between the number of vehicles and the aforementioned statistics is not linear though, as the addition of extra vehicles results in larger increases in average time and delay than previously experienced by drivers in the base year.

8.7. Looking at the average time and speed per vehicle helps to demonstrate the impact that will be felt by the average driver. For example, the VISSIM model predicts that the average driver will experience an increase of 29s in their journey time for the scenario with the proposed development compared to the reference case during the AM peak. In the PM peak, the average journey time increase would be 34s. The predicted increases in average travel times for such short routes are likely to be perceptible to road users.

8.8. In terms of speeds, the average driver is predicted to experience a reduction of 2mph and 3mph in their average speed in the AM and PM peak respectively.

Queue Length Results

8.9. Table 15 shows the queue lengths obtained at the approaches to all junctions and all scenarios, as well as the queues at the approaches to the on-street parking sections in Chapel Hill. The table shows both the hourly maximum and hourly average of the maximum queue recorded every 5-minute interval averaged over all simulation runs. A full set of queue length comparison graphs for each stopline are provided in Appendix C.

Table 15 – Queue results (m)

JUNCTION	QUEUE COUNTER	AM			PM		
		2018	2023+C	2023+C+D	2018	2023+C	2023+C+D
Maximum queues							
Junction 4 – Grove Hill signalised junction	41 - J4 - Lower Street LT	20.0	42.7	48.7	14.2	16.4	17.0
	42 - J4 - Lower Street RT	22.8	44.7	51.4	18.9	18.7	19.5
	43 - J4 - B1051 (N) RT	8.2	7.1	7.3	4.7	3.8	3.2
	44 - J4 – Lower Street Signal Stopline	56.0	74.1	91.8	48.2	77.9	87.9
	45 - J4 – Grove Hill Signal Stopline	26.5	28.5	30.2	32.0	27.4	28.7
	46 - Grove Hill (2nd queue)	115.3	317.9	671.5	59.1	210.9	485.3
Junction 5 – Chapel Hill Roundabout	51 - J5 – Lower Street	27.1	54.5	54.2	15.7	24.2	26.1
	52 - J5 - Castle	3.5	5.0	5.8	5.9	8.2	8.0
	53 - J5 - Church Road	32.5	41.7	53.2	25.7	47.3	41.0
	54 - J5 - Station Road LT	1.4	2.3	1.4	9.2	13.6	13.1
	55 - J5 - Station Road RT	0.7	1.3	0.9	3.9	5.0	4.7
	56 - J5 - Chapel Hill	44.2	63.1	73.0	42.3	66.3	72.3
Junction 10 – Cambridge Road / Chapel Hill / Silver Street / Bentfield Road priority junction	101 - J10 - Cambridge Road (N) RT	24.6	11.3	11.7	12.9	17.0	26.8
	102 - J10 - Chapel Hill LT	35.0	65.8	73.0	22.5	30.5	29.1
	103 - J10 - Chapel Hill RT	17.1	26.3	32.8	27.7	35.7	33.4
	104 - J10 - Silver Street RT	57.6	128.3	116.1	102.8	223.1	309.3
	105 - J10 Bentfield Road LT	19.5	23.2	21.4	22.6	27.8	26.2
	106 - J10 Bentfield Road RT	21.1	25.1	24.2	22.9	28.1	26.5
Chapel Hill	991 - Chapel Hill (E)	52.4	78.8	82.0	50.8	81.5	81.3
	992 - Chapel Hill (W)	65.1	99.0	102.8	58.9	95.0	108.4
Average queues							
Junction 4 – Grove Hill signalised junction	41 - J4 - Lower Street LT	12.0	24.6	28.5	9.0	12.5	12.3
	42 - J4 - Lower Street RT	16.8	27.9	31.8	13.2	15.9	16.0
	43 - J4 - B1051 (N) RT	1.2	1.7	2.7	2.1	1.7	1.3
	44 - J4 – Lower Street Signal Stopline	37.2	52.1	59.6	39.6	58.1	69.5
	45 - J4 – Grove Hill Signal Stopline	23.8	26.5	27.5	25.6	25.8	26.5
	46 - Grove Hill (2nd queue)	87.5	192.2	335.4	37.6	126.7	287.0
Junction 5 – Chapel Hill Roundabout	51 - J5 – Lower Street	21.1	33.8	39.1	10.0	14.6	18.2
	52 - J5 - Castle	1.5	2.3	2.6	3.6	4.8	4.3
	53 - J5 - Church Road	20.2	28.6	32.2	21.4	32.7	33.9
	54 - J5 - Station Road LT	0.4	0.7	0.5	4.2	6.8	6.5
	55 - J5 - Station Road RT	0.3	0.4	0.3	2.3	2.7	3.0
	56 - J5 - Chapel Hill	18.4	28.5	34.2	28.6	47.2	52.3
Junction 10 – Cambridge Road / Chapel Hill / Silver Street / Bentfield Road priority junction	101 - J10 - Cambridge Road (N) RT	5.3	6.4	6.8	6.7	11.0	11.9
	102 - J10 - Chapel Hill LT	19.4	32.7	40.1	12.5	22.0	22.1
	103 - J10 - Chapel Hill RT	13.8	17.3	16.9	13.8	16.9	18.1
	104 - J10 - Silver Street RT	37.2	73.9	74.3	73.5	154.1	213.6
	105 - J10 Bentfield Road LT	11.3	15.1	14.7	9.6	11.7	11.6
	106 - J10 Bentfield Road RT	13.5	16.4	16.3	10.6	12.9	12.6
Chapel Hill	991 - Chapel Hill (E)	38.5	62.4	71.6	36.9	61.0	68.6
	992 - Chapel Hill (W)	39.6	61.7	71.3	42.0	69.1	79.8

8.10. Generally, queue lengths remain similar between the forecast year scenarios for both the AM and PM peaks. However, there is a couple of locations where the maximum queue increases significantly between the with and without proposed development scenarios. These are as follows:

- Grove Hill southbound secondary queue - AM queue increases by 354m (~ 59 vehicles), PM queue increases by 274m (~ 46 vehicles); and
- Silver Street right turn onto Chapel Hill - PM queue increases by 86m (~ 14 vehicles).

8.11. The average queue results help to reinforce the conclusions obtained from the maximum queues. The only locations where the average queues are expected to increase significantly are the Grove Hill southbound approach during the AM and PM peaks and the Silver Street approach during the PM peak.

8.12. Due to the proximity between the Lower Street / Grove Hill junction (J4) and the Chapel Hill mini roundabout (J5), a more detailed analysis has been performed on the Lower Street approach to the Lower Street / Grove Hill junction (queue counter #44) and the Lower Street approach to the Chapel Hill mini roundabout (queue counter #51) to determine the likelihood of the queues reaching back to the upstream junction.

8.13. Maximum queue lengths have been obtained in 15-second intervals for each simulation run. The tables below show the absolute maximum queue recorded at any point in the modelled period and within any of the modelled runs, as well as the percentage of runs where these queues reach the upstream junction and the longest duration of these situations in any of the runs.

8.14. Table 16 shows the queue propagation analysis for the AM peak. During the base year, the queues at both approaches reach the upstream junctions in 6% of the simulation runs for a maximum time of 30s. Due to the additional traffic in the forecast year scenarios, occasions where the queues reach the upstream junction and the duration of these increase. For example, in the scenario with the proposed development the northbound queue at the Grove Hill signals (J4) is recorded to reach the Chapel Hill mini roundabout (J5) in 50% of the runs, although this queue is never present for more than 105 seconds. On the opposite side, the southbound queue at the Chapel Hill mini roundabout (J5) is observed to reach the Grove Hill signals (J4) in 32% of the runs, with a maximum blocking time of 75 seconds.

8.15. Instances of the individual simulation runs where these problems occur have been observed, demonstrating that the nature of the queue is intermittent and its effect on the upstream approaches is very limited. This will be corroborated in the journey time and delay analysis in the sections below.

Table 16 – Lower Street / mini roundabout queue propagation analysis – AM peak

Scenario	Queue direction	Distance between junctions (m)	Absolute maximum queue (m)	Percentage of runs where queue reaches upstream junction (%)	Maximum length of time during which queue reaches upstream junction (s)
2018	Northbound	110	139	6	30
	Southbound	110	114	6	30
2023+C	Northbound	110	171	28	45
	Southbound	110	134	28	45
2023+C+D	Northbound	110	177	50	105
	Southbound	110	179	32	75

8.16. Table 17 shows the queue propagation analysis for the PM peak. The results show that the addition of the proposed development traffic increases the likelihood of the queue at the Grove hill signals reaching the Chapel Hill mini roundabout, but not the maximum duration of this situation. On the opposite direction, southbound queues have not been recorded to reach the Grove Hill signals in the scenario with the proposed development.

Table 17 – Lower Street queue propagation analysis – PM peak

Scenario	Queue direction	Distance between junctions (m)	Absolute maximum queue (m)	Percentage of runs where queue reaches upstream junction (%)	Maximum length of time during which queue reaches upstream junction (s)
2018	Northbound	110	83	0	-
	Southbound	110	53	0	-
2023+C	Northbound	110	145	16	60
	Southbound	110	123	5	30
2023+C+D	Northbound	110	171	63	45
	Southbound	110	88	0	-

Journey Time Results

8.17. Table 18 shows the average journey time between Grove Hill (at Gorsefield school) and the Silver Street / Mill Side junction via Chapel Hill. For the westbound direction, the Grove Hill end of the section has been extended up to the M11 bridge to capture the additional delay caused by queuing vehicles on Grove Hill.

Table 18 – Average Journey times (min) through Stansted Mountfitchet

SCENARIO	WESTBOUND		EASTBOUND	
	AM	PM	AM	PM
2018	5.6	5.5	3.1	3.0
2023 Reference Case	7.8	8.3	3.6	3.5
2023 With Development	9.8	12.9	3.8	3.7

8.18. The average journey time westbound would increase by 2 minutes in the AM peak and over 4 minutes in the PM peak due to the addition of the proposed development.

8.19. This increase in journey time, as well as the increase between the base year and the reference case, would result in a significant impact on drivers travelling from Elsenham towards Bishops Stortford, and it is possible that they would reroute to other roads such as the A120 (through Stansted Airport). The effect of the additional traffic from the proposed development on the eastbound movement is less significant.

8.20. Figure 9 shows a breakdown of the average journey time for each road sections and scenario during the AM peak. The graph clearly demonstrates that the majority of the increase in average journey time through Stansted Mountfitchet is concentrated to the southbound approach to the Grove Hill signals (journey time sections #101 and #200). The addition of the proposed development would result in a combined increase in average journey time for these two sections of 2 min.

8.21. The increase in average journey time for the rest of the road sections is not greater than 10s and thus the impact in the rest of the road sections is not likely to be perceivable by the average driver.

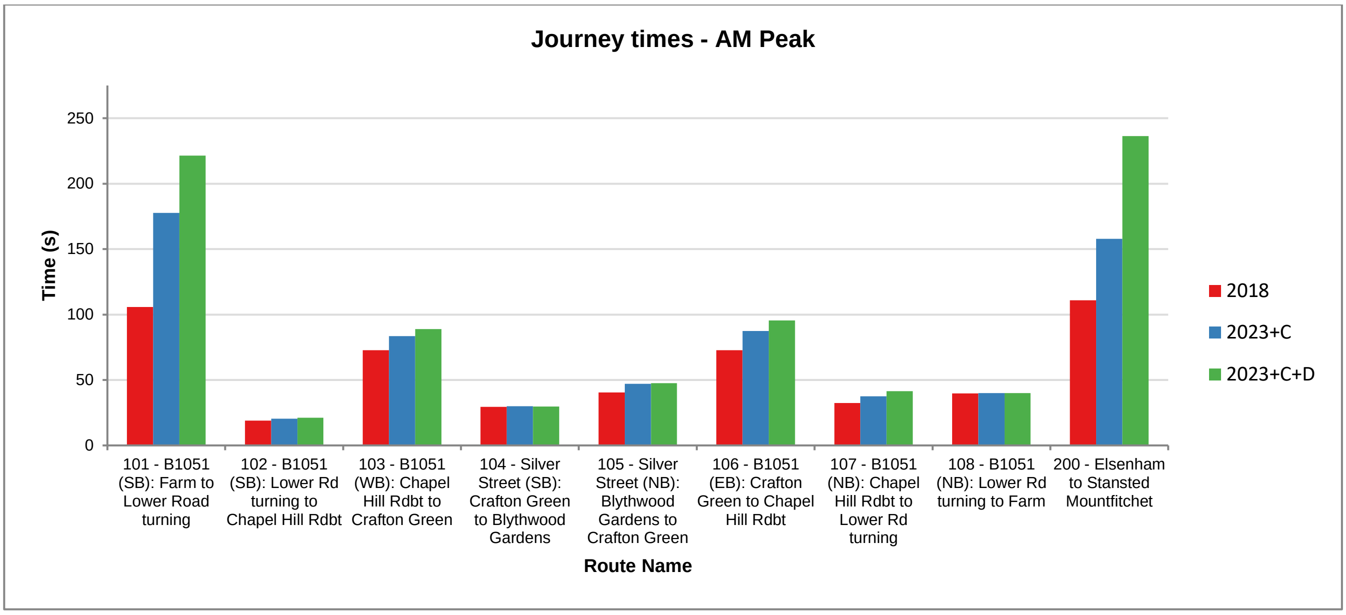


Figure 9 – AM peak modelled travel times

8.22. Figure 10 illustrates the average journey time for all the road sections and scenarios during the PM peak. As with the AM peak, the main increase in journey times is found at the southbound approach to the Grove Hill signals (journey time sections #101 and #200). The impact of the proposed development is larger in the PM peak, resulting in an increase of 4.4 min for the average driver.

8.23. The fact that the increase in the average journey time is higher in the PM peak than the AM peak could seem contradictory as the increase in westbound traffic is much greater in the AM. However, this is due to the limited maximum green time for the southbound stage, which is set at 14s in the PM peak compared to 36s in the AM peak. This means that a small increase in traffic can easily tip over the saturation flow.

8.24. The increase in journey times for the rest of the road sections is not greater than 10s and thus is not likely to be perceivable by drivers.

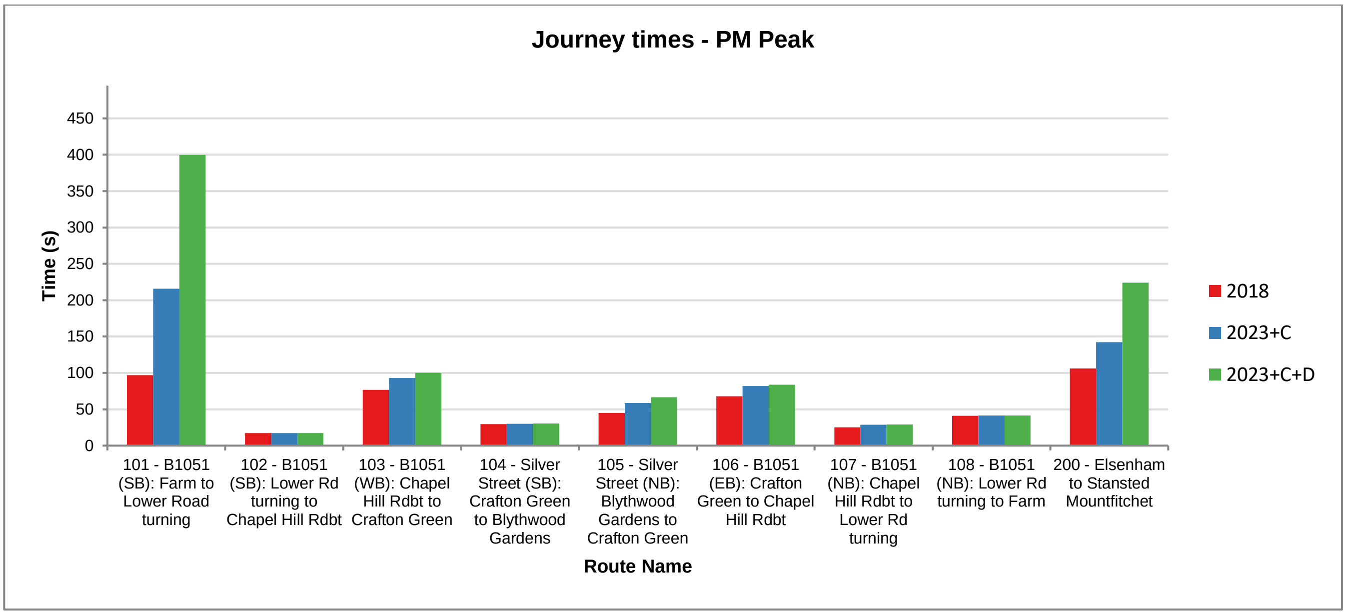


Figure 10 - PM peak modelled travel times

Delay Results

8.25. Table 19 shows the average delay per approach and scenario. The delay shown in the table is the average delay recorded every 15-minute interval weighted by turning proportion and averaged over all simulation runs.

Table 19 – Average delay (s) per approach

JUNCTION	APPROACH	AM			PM		
		2018	2023+C	2023+C+D	2018	2023+C	2023+C+D
Junction 4 – Grove Hill signalised junction	Grove Hill	86.7	183.3	275.8	75.1	209.7	439.4
	Lower St (S)	22.1	29.4	33.5	15.5	20.2	21.4
	Lower St (N)	8.1	19.3	24.8	7.1	10.2	11.4
Junction 5 – Chapel Hill roundabout	Lower St.	6.4	9.1	10.3	4.9	6.5	6.9
	Station Car Park	10.3	12.4	14.4	9.4	11.5	11.2
	Church Road	7.6	11.3	13.6	7.5	13.3	13.9
	Station Road	16.2	22.6	21.7	18.1	30.3	30.1
	Chapel Hill	10.5	12.8	14.5	11.6	16.0	16.7
Junction 10 – Cambridge Road / Chapel Hill / Silver Street / Bentfield Road priority junction	Cambridge Road	12.3	15.7	15.7	13.2	16.0	16.3
	Chapel Hill	8.5	11.9	13.8	8.0	10.5	10.8
	Silver Street	11.8	18.0	18.9	17.7	33.0	44.3
	Bentfield Road	9.9	13.3	13.4	10.0	12.3	12.7
Chapel Hill	Westbound	20.0	29.4	33.1	26.4	41.6	48.6
	Eastbound	26.2	39.0	45.4	21.3	31.0	32.9

8.26. The table demonstrates that the level of delay experienced at most of the approaches to the junctions remains very low across all modelled scenarios. However, there are some locations where the delay increases significantly for the scenario with the proposed development:

- Similar to the results observed in the journey time section, the largest increase of delay is found at the Grove Hill southbound approach, with an average increase of 1.5 min and 3.8 min in the AM and PM peaks respectively; and
- The average delay for the vehicles on the Silver Street approach to the Bentfield Road / Silver Street / Chapel Hill junction increases by 11s in the PM peak.

8.27. The table demonstrates that the increased likelihood of queues on Lower Street reaching the upstream junctions in the scenario with the proposed development has a minimal effect on the delay at the upstream approaches.

Summary

8.28. Overall the VISSIM model demonstrates that the impact of additional vehicle trips on the local road network in Stansted Mountiftchet due to both the committed developments and the proposed residential development in Elsenham will be significant. The main findings are summarised below:

- The additional traffic on the Grove Hill southbound approach leads to queue lengths beyond operational levels and notable increases in westbound journey times in both peak hours. This would have a large impact on the journey time and delay that drivers using the B1051 from Elsenham to Stansted Mountfitchet experience, and it is likely that some of them would reroute as a cause of the increased delay.
- The queue length at the Silver Street approach to Chapel Hill will significantly increase in the PM peak as a result of both the committed and proposed developments. However, due to the nature of this movement the effect on journey times and delays is relatively low.
- The likelihood of the queues at Lower Street reaching the Lower Street / Grove Hill junction and Chapel Hill mini roundabout increases during the AM peak compared to the reference case. However, this level of queuing occurs for a short period of time and the queues dissipates quickly. The effect of these situations on journey times and delays is barely noticeable.

9. Mitigation Proposals

9.1. High levels of queueing and delay are forecasted to occur at the Grove Hill southbound approach to the Lower Street / Grove Hill junction in the forecast year as a result of the committed and proposed developments. A mitigation scheme is therefore necessary at this location.

9.2. During the observation of the video footage at the Grove Hill southbound approach it was noticed that the current signal operation does not allow for detection of the southbound approach secondary queue. Three above ground detectors are present at the southbound phase and are mounted on two poles at the southbound stopline. Based on discussion with ECC, these detectors are believed to cover the area from the secondary signal pole to approximately 40 m. upstream of the stopline. These detectors act as both demand and extension detectors, with an extension of four seconds. Vehicles waiting at the secondary queue (located 100m. upstream of the stopline) are therefore not within the detection range. Often by the time they proceed and reach the detection range, the stage is over as the extension time has been exceeded.

9.3. Figure 11 shows the southbound green time distribution obtained from the survey during the AM peak. Even though there was demand at the secondary queue during 80% of the cycles in the AM peak (based on video footage observation), the graph shows that 60% of the time the stage is run with a short green time (16s or shorter), demonstrating that the vehicles at the secondary queue are not able to reach the detector before it gaps out. During these cycles, only the vehicles in the primary queue are able to proceed (2-3 vehicles on average). This creates a constraint in terms of the throughput of the southbound movement.

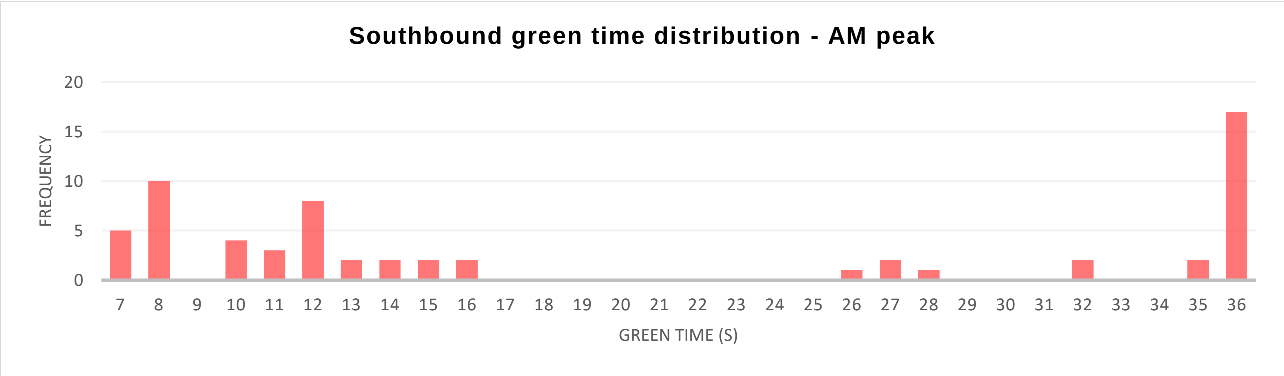


Figure 11 – Grove Hill / Lower Street signal. Observed southbound green time distribution – AM peak.

9.4. In order to solve this problem on the southbound approach, two methods of mitigation have been considered: a new detector at the secondary queue location or an increase of the extension time for the southbound stage.

9.5. On top of the gap-changing problem, the maximum green time for the southbound stage during the PM peak is very limited, demonstrating that it is no longer enough to accommodate the additional demand from the committed and proposed developments. Thus, maximum green times are recommended to be revised regardless of which mitigation is chosen.

A. New detector at the secondary queue

9.6. A new detector is proposed to register the presence of vehicles at the secondary queue, as shown in Figure 12. This detector would act as both a demand and an extension detector. This detector should prevent the stage ending when demand is present and allow the vehicles in the secondary queue to proceed with less delay.

9.7. The type of detector, exact location and detection range would need to be assessed at a later stage but the concept of improved southbound detection appears to effectively mitigate the congestion caused by the committed and proposed developments.

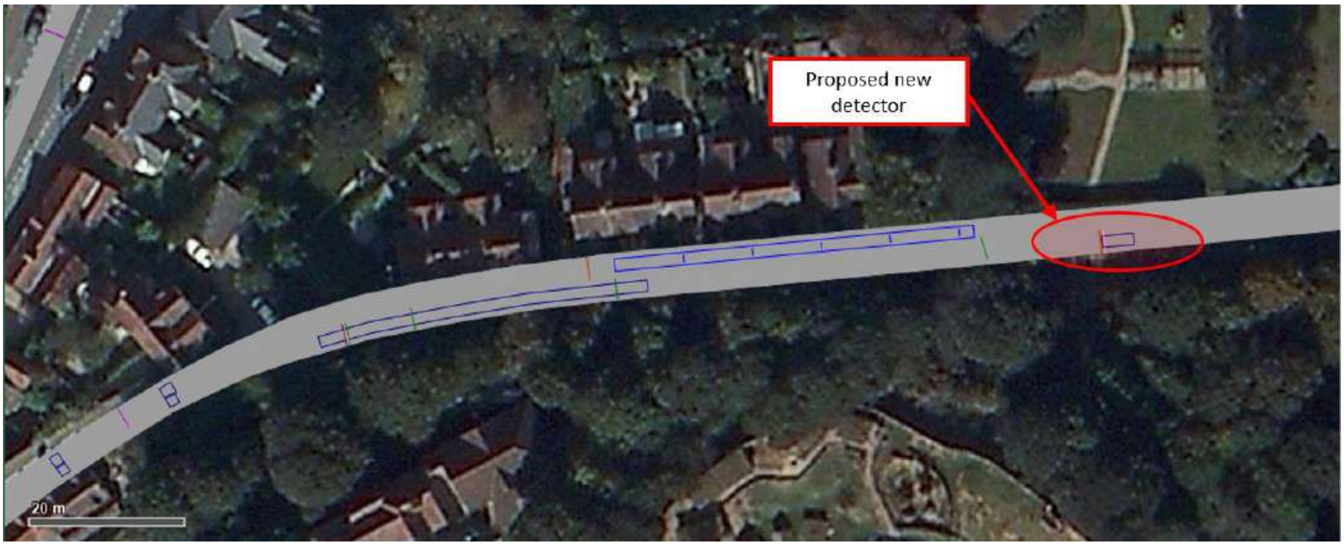


Figure 12 – Approximate location of the proposed detector

9.8. In addition to a new detector, maximum green times are proposed for modification to take into account the increased demand at the junction. The proposed maximum green times are shown in Table 20. These maximum green times have not been optimised and have been selected to avoid cutting short the northbound stage in the AM peak and southbound stage in the PM peak.

Table 20 – Proposed maximum green times (seconds)

PHASE	AM	PM
A (northbound)	25	40
B (southbound)	40	25

B. Increased extension time for the southbound stage

9.9. An alternative method to prevent the southbound stage from cutting short is to increase the extension time for the southbound stage. Increasing the extension time would allow the vehicles at the secondary queue to reach the detection range before the stage gaps out. The new extension time should be calibrated to avoid gap-changing in most of the cycles. In this assessment, an extension time of 8s has been tested.

9.10. In addition to the increased extension, maximum green times have been modified as shown in mitigation A.

9.11. It should be noted that mitigation proposal B will not be as efficient as a new detector at the secondary queue (proposal A) because in some cycles the southbound stage would be unnecessarily extended when there are no vehicles at the secondary queue and in other cycles the vehicles at the secondary queue may have taken longer than the increased extension time to reach the detection range. The reason for consideration of mitigation proposal B is in response to concerns from ECC that an additional detector would be costly to maintain and more disruptive to implement.

10. Mitigation proposal results

10.1. A total of 20 simulation runs were modelled for each mitigation proposal. Two simulation runs in the AM peak and one in the PM peak were excluded from the analysis as some of the driving behaviour observed during the runs was deemed unrealistic, as explained in paragraph 8.13.

Grove Hill signal controller green time distribution

10.2. Figure 13 shows the green time distributions for the stages of the Grove Hill signal controller in the scenarios with and without mitigation during the AM peak. The graphs clearly show that both mitigations are able to avoid the gap-change of the southbound stage and run most of the cycles at maximum green. The mitigation with the new detector proves to be slightly better than the mitigation with the increased southbound extension, which still shows a few cycles where the stage gap-changes.

10.3. As a result of these mitigations, the effective green time for the southbound stage increases with respect to the southbound stage. This could lead to a situation where the green time provided for the northbound stage is not enough to cater for the demand. In order to solve this, the maximum green time for the northbound stage has been increased to 25s. By providing longer cycle times the overall effective green time for the controller would significantly increase and its operation would improve.

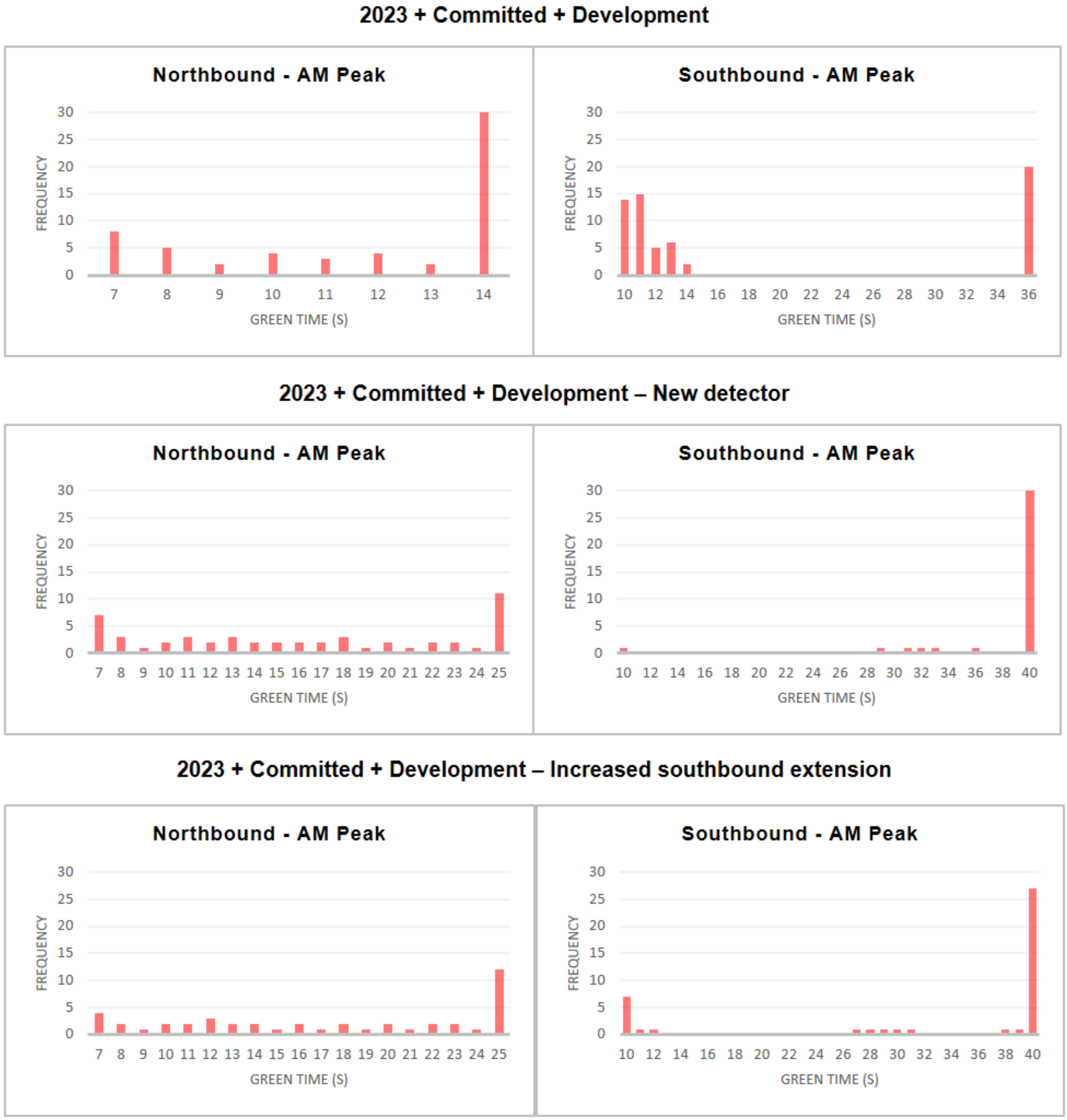


Figure 13 – Green time distribution – AM peak

10.4. Figure 14 shows the green time distribution for the stages at the Grove Hill signal controller during the PM peak. In this case, the problem at the southbound stage lies in the maximum green time rather than the gap change of the stage. Due to the limited maximum green time, the vehicles at the secondary queue are never able to go through the signals. With the additional traffic from the committed and proposed developments, this means that the green time available for this stage is no longer enough to accommodate the demand.

10.5. By providing an increased maximum green time and the proposed mitigations, the stage is now run most of the times at maximum green time and is able to provide enough green time for the forecast flow. Similar as in the AM peak, the performance of the mitigation with the new detector is slightly better than the one with the increased southbound extension as it is able to avoid all the gap changing situations.

Figure 14 – Green time distribution – PM peak

Overall Network Performance Results

10.6. A number of network wide statistics have been extracted for the mitigation scenarios which indicate how the overall performance of the network compares to the original scenarios. These results are displayed in Table 21.

Table 21 – Network Performance Model Results

NETWORK STATISITIC	AM PEAK					PM PEAK				
	2018	2023+C	2023+C+D	2023+C+D – New detector	2023+C+D – Increased southbound extension	2018	2023+C	2023+C+D	2023+C+D – New detector	2023+C+D – Increased southbound extension
Total Time (h)	75	109	134	113	115	75	110	140	120	121
Total Distance (km)	2,426	2,933	3,147	3,208	3,207	2,365	2,858	3,015	3,060	3,059
Total Vehicles	2,192	2,530	2,632	2,626	2,628	2,397	2,735	2,838	2,835	2,840
Total Delay (h)	22	45	66	43	46	22	46	73	51	52
Average Time (s) / Vehicle	123	154	183	155	158	113	144	178	152	153
Average Time (s) / Mile	179	214	247	204	208	184	222	269	226	228
Average Distance (m) / Vehicle	1,107	1,160	1,196	1,222	1,220	986	1,045	1,062	1,079	1,077
Average Speed (mph)	20	17	15	18	17	20	16	13	16	16
Average Speed (kph)	32	27	24	28	28	31	26	22	26	25
Average Delay / Vehicle (s)	37	64	90	59	63	33	60	92	65	66

10.7. The table shows that the network results of both mitigation proposals are similar in both time peaks. The time and delay experienced by the average driver is considerably reduced compared to the scenario without mitigation. For example, an average driver would experience a reduction of 28s and 25s in their journey time through Stansted Mountfitchet during the AM peak for the scenario with the new detector and the increased southbound extension time respectively. During the PM peak, the average reduction in journey times would be 26s and 25s respectively.

10.8. The table shows that overall both mitigations fulfil their purpose and remove any negative effect that the additional traffic from the proposed development has on the network.

Queue Results

10.9. Table 22 shows the maximum and average queues at all junction approaches as well as the approaches to the Chapel Hill on-street parking section. The results from the scenarios with the proposed mitigations are listed next to the original scenarios for comparison.

Table 22 – Queue results (in m)

JUNCTION	QUEUE COUNTER	AM 2018	AM 2023+C	AM 2023+C+D	AM 2023+C+D – New detector	AM 2023+C+D – Increased southbound extension	PM 2018	PM 2023+C	PM 2023+C+D	PM 2023+C+D – New detector	PM 2023+C+D – Increased southbound extension
Maximum queues											
Junction 4 – Grove Hill signalised junction	41 - J4 - Lower Street LT	20.0	42.7	48.7	43.2	46.6	14.2	16.4	17.0	23.7	31.7
	42 - J4 - Lower Street RT	22.8	44.7	51.4	45.8	48.8	18.9	18.7	19.5	26.8	34.1
	43 - J4 - B1051 (N) RT	8.2	7.1	7.3	10.9	9.3	4.7	3.8	3.2	7.4	3.0
	44 - J4 – Lower Street Signal Stopline	56.0	74.1	91.8	104.8	100.9	48.2	77.9	87.9	107.1	119.0
	45 - J4 – Grove Hill Signal Stopline	26.5	28.5	30.2	28.1	29.0	32.0	27.4	28.7	28.4	28.1
	46 - Grove Hill (2nd queue)	115.3	317.9	671.5	149.2	166.5	59.1	210.9	485.3	112.0	120.3
Junction 5 – Chapel Hill roundbaut	51 - J5 – Lower Street	27.1	54.5	54.2	64.8	68.2	15.7	24.2	26.1	42.8	41.2
	52 - J5 - Castle	3.5	5.0	5.8	5.3	5.6	5.9	8.2	8.0	10.0	10.6
	53 - J5 - Church Road	32.5	41.7	53.2	52.6	56.5	25.7	47.3	41.0	72.1	71.1
	54 - J5 - Station Road LT	1.4	2.3	1.4	3.3	2.9	9.2	13.6	13.1	17.2	15.4
	55 - J5 - Station Road RT	0.7	1.3	0.9	1.5	1.9	3.9	5.0	4.7	4.5	4.8
	56 - J5 - Chapel Hill	44.2	63.1	73.0	83.9	72.9	42.3	66.3	72.3	80.3	91.4
Junction 10 – Cambridge Road / Chapel Hill / Silver Street / Bentfield Road priority junction	101 - J10 - Cambridge Road (N) RT	24.6	11.3	11.7	13.5	21.5	12.9	17.0	26.8	30.3	24.6
	102 - J10 - Chapel Hill LT	35.0	65.8	73.0	69.3	73.2	22.5	30.5	29.1	47.7	36.4
	103 - J10 - Chapel Hill RT	17.1	26.3	32.8	27.0	27.8	27.7	35.7	33.4	50.0	38.5
	104 - J10 - Silver Street RT	57.6	128.3	116.1	144.6	162.9	102.8	223.1	309.3	342.1	337.2
	105 - J10 Bentfield Road LT	19.5	23.2	21.4	23.9	21.2	22.6	27.8	26.2	26.3	29.5
	106 - J10 Bentfield Road RT	21.1	25.1	24.2	25.2	23.1	22.9	28.1	26.5	26.6	29.7
Chapel Hill	991 - Chapel Hill (E)	52.4	78.8	82.0	96.3	95.0	50.8	81.5	81.3	98.4	109.5
	992 - Chapel Hill (W)	65.1	99.0	102.8	106.7	113.2	58.9	95.0	108.4	115.7	106.1
Average queues											
Junction 4 – Grove Hill signalised junction	41 - J4 - Lower Street LT	12.0	24.6	28.5	28.0	28.6	9.0	12.5	12.3	15.3	18.4
	42 - J4 - Lower Street RT	16.8	27.9	31.8	31.3	31.9	13.2	15.9	16.0	18.8	22.0
	43 - J4 - B1051 (N) RT	1.2	1.7	2.7	4.1	4.2	2.1	1.7	1.3	2.0	1.2
	44 - J4 – Lower Street Signal Stopline	37.2	52.1	59.6	69.6	68.6	39.6	58.1	69.5	87.9	100.5
	45 - J4 – Grove Hill Signal Stopline	23.8	26.5	27.5	26.5	27.2	25.6	25.8	26.5	26.0	26.0
	46 - Grove Hill (2nd queue)	87.5	192.2	335.4	122.6	139.3	37.6	126.7	287.0	86.9	90.0
Junction 5 – Chapel Hill roundbaut	51 - J5 – Lower Street	21.1	33.8	39.1	49.4	51.8	10.0	14.6	18.2	27.1	28.2
	52 - J5 - Castle	1.5	2.3	2.6	2.9	3.1	3.6	4.8	4.3	5.7	6.4
	53 - J5 - Church Road	20.2	28.6	32.2	34.9	35.8	21.4	32.7	33.9	44.3	47.2
	54 - J5 - Station Road LT	0.4	0.7	0.5	0.8	0.6	4.2	6.8	6.5	8.1	8.0
	55 - J5 - Station Road RT	0.3	0.4	0.3	0.5	0.4	2.3	2.7	3.0	3.0	2.9
	56 - J5 - Chapel Hill	18.4	28.5	34.2	40.8	37.9	28.6	47.2	52.3	65.2	62.1
Junction 10 – Cambridge Road / Chapel Hill / Silver Street / Bentfield Road priority junction	101 - J10 - Cambridge Road (N) RT	5.3	6.4	6.8	6.1	8.9	6.7	11.0	11.9	15.1	12.2
	102 - J10 - Chapel Hill LT	19.4	32.7	40.1	44.2	44.3	12.5	22.0	22.1	28.6	27.9
	103 - J10 - Chapel Hill RT	13.8	17.3	16.9	19.1	17.7	13.8	16.9	18.1	19.7	19.5
	104 - J10 - Silver Street RT	37.2	73.9	74.3	81.6	84.6	73.5	154.1	213.6	237.4	225.2
	105 - J10 Bentfield Road LT	11.3	15.1	14.7	15.0	14.5	9.6	11.7	11.6	11.3	11.7
	106 - J10 Bentfield Road RT	13.5	16.4	16.3	16.7	16.1	10.6	12.9	12.6	12.4	12.8
Chapel Hill	991 - Chapel Hill (E)	38.5	62.4	71.6	78.0	78.3	36.9	61.0	68.6	81.4	78.9
	992 - Chapel Hill (W)	39.6	61.7	71.3	77.0	77.2	42.0	69.1	79.8	89.2	88.3

10.10. The table shows that both proposed mitigations greatly reduce maximum and average queue lengths at the Grove Hill southbound approach. The results demonstrate that these mitigations not only remove the effect that the proposed development had on queue lengths at Grove Hill, but are also able to mitigate part of the impact created by the committed developments.

10.11. On the other hand, the implementation of these mitigations results in slight increases of queue lengths at the Lower Street approach to the Grove Hill junction (queue counter #44) and Chapel Hill mini roundabout (queue counter #51), Church Road (queue counter #53), Silver Street (queue counter #104) and Chapel Hill East (queue counter #991). However, the magnitude of these changes is not comparable to the improvement observed on Grove Hill.

10.12. Due to the increase in queue lengths at the Lower Street approaches to the Grove Hill signal junction and Chapel Hill mini roundabout, it is important to analyse the potential impact of the queues reaching the upstream junctions. In order to do so, a more detailed analysis has been conducted where maximum queue lengths have been recorded every 15-second interval at the Lower Street approach to the Grove Hill signals (queue counter #44) and the Lower Street approach to Chapel Hill mini roundabout (queue counter #51), checking the percentage of simulation runs where this situation happens and the longest time recorded.

10.13. Table 23 shows the queue propagation analysis for the AM peak. The likelihood of the queues at the Lower Street approach to the Grove Hill signals (northbound) and the Chapel Hill mini roundabout (southbound) increases as a result of the mitigations. However, the maximum length of time during which the queues reach the upstream junctions is actually reduced for the northbound approach and slightly increased for the southbound approach in the scenario with the new detector. In the case of the increased southbound extension the maximum times remain the same.

Table 23 – Lower Street queue propagation analysis – AM peak

Scenario	Queue direction	Distance between junctions (m)	Absolute maximum queue (m)	Percentage of runs where queue reaches upstream junction (%)	Maximum length of time during which queue reaches upstream junction (s)
2018	Northbound	110	139	6	30
	Southbound	110	114	6	30
2023+C	Northbound	110	171	28	45
	Southbound	110	134	28	45
2023+C+D	Northbound	110	177	50	105
	Southbound	110	179	32	75
2023 + C + D – New detector	Northbound	110	171	72	75
	Southbound	110	168	56	120
2023 + C + D – Increased southbound extension	Northbound	110	176	78	105
	Southbound	110	170	61	75

10.14. Table 24 shows the queue propagation analysis for the PM peak. Similar to the AM peak, the likelihood of the queues at the Lower Street approach to the Grove Hill signals (northbound) and to the Chapel Hill mini roundabout (southbound) increases as a result of the mitigations. Besides, the maximum time during which these queues reach the upstream junctions also increase, but for no more than 3 minutes in any of the simulation runs.

10.15. Instances of the individual simulation runs where these problems occur have been observed, showing that the nature of the queue is intermittent and it quickly dissipates, and thus the effect on the upstream approaches is limited. This will be corroborated in the delay analysis in the section below.

Table 24 – Lower Street queue propagation analysis – PM peak

Scenario	Queue direction	Distance between junctions (m)	Absolute maximum queue (m)	Percentage of runs where queue reaches upstream junction (%)	Maximum length of time during which queue reaches upstream junction (s)
2018	Northbound	110	83	0	-
	Southbound	110	53	0	-
2023+C	Northbound	110	145	16	60
	Southbound	110	123	5	30
2023+C+D	Northbound	110	171	63	45
	Southbound	110	88	0	-
2023 + C + D – New detector	Northbound	110	173	100	120
	Southbound	110	163	16	180
2023 + C + D – Increased southbound extension	Northbound	110	172	100	180
	Southbound	110	119	11	120

Journey Time Results

10.16. Table 25 shows the average journey times through Stansted Mountfitchet for the mitigation scenarios in comparison to the original scenarios.

Table 25 – Average journey times (min) through Stansted Mountfitchet

Scenario	Westbound		Eastbound	
	AM	PM	AM	PM
2018	5.6	5.5	3.1	3.0
2023+C	7.8	8.3	3.6	3.5
2023+C+D	9.8	12.9	3.8	3.7
2023+C+D – New detector	6.5	7.0	4.0	4.0
2023+C+D – Increased southbound extension	6.8	7.1	4.1	4.0

10.17. The table demonstrates that both mitigations achieve a great reduction in westbound journey times during both peak hours. For example, the average journey time westbound is reduced by 3.3 min and 3.0 min for the scenario with the new detector and the scenario with the increased southbound extension compared to the scenario without mitigation. In the PM peak, this reduction is even greater, with 5.9 and 5.8 min respectively. The improvement achieved in both scenarios not only mitigate the impact of the proposed development, but also manage to mitigate part of the effects caused by the committed developments.

10.18. The effect of the proposed mitigations on the average eastbound journey time is not significant.

Delay Results

10.19. Table 26 shows the average delay per approach in all modelled scenarios.

Table 26 – Average delay (s) per approach

JUNCTION	APPROACH	AM					PM				
		2018	2023+C	2023+C+D	2023+C+D – New detector	2023+C+D – Increased southbound extension	2018	2023+C	2023+C+D	2023+C+D – New detector	2023+C+D – Increased southbound extension
Junction 4 – Grove Hill signalised junction	Grove Hill	86.7	183.3	275.8	96.8	111.4	75.1	209.7	439.4	111.8	119.9
	Lower St (S)	22.1	29.4	33.5	37.4	39.1	15.5	20.2	21.4	27.3	30.8
	Lower St (N)	8.1	19.3	24.8	25.8	25.1	7.1	10.2	11.4	16.0	22.0
Junction 5 – Chapel Hill roundabout	Lower St.	6.4	9.1	10.3	11.6	12.5	4.9	6.5	6.9	10.3	11.0
	Station Car Park	10.3	12.4	14.4	15.1	15.0	9.4	11.5	11.2	12.9	13.8
	Church Road	7.6	11.3	13.6	15.5	15.7	7.5	13.3	13.9	20.4	25.2
	Station Road	16.2	22.6	21.7	26.8	24.9	18.1	30.3	30.1	40.8	41.5
	Chapel Hill	10.5	12.8	14.5	16.1	15.6	11.6	16.0	16.7	19.7	20.9
Junction 10 – Cambridge Road / Chapel Hill / Silver Street / Bentfield Road priority junction	Cambridge Road	12.3	15.7	15.7	15.7	16.0	13.2	16.0	16.3	16.6	16.2
	Chapel Hill	8.5	11.9	13.8	14.5	14.5	8.0	10.5	10.8	11.8	12.0
	Silver Street	11.8	18.0	18.9	20.0	21.6	17.7	33.0	44.3	49.6	46.8
	Bentfield Road	9.9	13.3	13.4	13.3	13.3	10.0	12.3	12.7	12.4	13.2
Chapel Hill	EB	20.0	29.4	33.1	33.4	33.4	26.4	41.6	48.6	52.9	52.3
	WB	26.2	39.0	45.4	50.9	52.8	21.3	31.0	32.9	38.3	38.0

10.20. Both proposed mitigations remarkably reduce the delay at the Grove Hill approach during both peak hours. In the AM peak, the delay reduction is 3.0 min and 2.8 min for the scenario with the new detector and the one with the increased southbound extension respectively. In the PM peak, this reduction in average delay is even greater, 5.5 min and 5.3 min respectively.

10.21. Consistently with the outcomes from the previous sections, the results show that both mitigations remove the effect from the additional traffic of the proposed development and achieve a better performance than the scenario with the committed developments.

10.22. Some locations experience a slight increase in average delay due to the proposed mitigations, such as the Lower Street (S) approach to the Grove Hill signals, Station Road and Church Road approaches to the Chapel Hill mini roundabout and the Chapel Hill eastbound approach to the on-street parking section. However, the magnitude of these increases in delay ranges between 5 – 12 seconds and thus are not comparable to the improvement achieved in Grove Hill.

10.23. Delays at the mini roundabout are not shown to increase significantly because whilst blocking back from the Grove Hill signals does occur for short periods, it does not happen for long enough to have a significant impact on delays. It is therefore unlikely that the average driver would perceive any impact to their journey.

Summary

10.24. The VISSIM model demonstrates that both proposed mitigations fulfil their purpose and completely remove the effect of the additional traffic related to the proposed development on Grove Hill. Not only that, but they are also able to mitigate part of the impact caused by the committed developments. Generally, the proposed mitigation “A: new detector” achieves slightly better results overall than proposed mitigation “B: increased southbound extension”.

11. ECC Improvements to Grove Hill Traffic Signals

11.1. ECC is expected to provide an improvement to the Grove Hill traffic signals equipment during Spring 2019. Information provided by Essex Highways suggests that the improvement works will consist of:

- Replacement of the “all-red” carriageway loops with above ground detectors.
- Replacement of southbound microwave detectors.
- New modern traffic signal controller that can be easily reconfigured.
- New modern “extra low voltage” energy efficient signal equipment.
- New LED signal heads.

11.2. Whilst the improvements are expected to achieve lower maintenance requirements, the effect of the improvement works on the performance of the traffic signals is predicted to be limited. Even though the southbound detectors will be replaced, it is highly unlikely that the detection range will reach the secondary queue on Grove Hill (approx. 100m. from the stopline). The approximate range of detection is anticipated to be in the region of 40m. based on discussions with Essex Highways. The southbound stage is therefore still expected to ‘gap-out’ during a significant proportion of cycles.

11.3. The developer proposed mitigation measures detailed in this Technical Note are compatible with ECC improvements. These measures would be implemented after the improvement works carried out by ECC.

11.4. The proposed mitigation measures would be secured through a Section 106 Agreement. Installation of the proposed mitigations would be achieved through a Section 278 Agreement with ECC.

12. Conclusion

12.1. The Stansted Mountfitchet VISSIM model provides a robust base evidence which has been used to assess the operational performance of the network in 2023 with the addition of the proposed development at Elsenham. Key conclusions from the study are set out below.

12.2. The unmitigated effect of the additional traffic generated by the development “Land East of Elsenham” during both peak hours leads to queue lengths beyond operational levels on the Grove Hill southbound approach and notable increases in westbound journey times. This effect is already observed in the reference case scenario (2023 + committed developments), with the proposed development worsening the situation.

12.3. In order to reduce the impact generated by the proposed development, two separate mitigation measures have been tested for the Grove Hill signalised junction in this Technical Note:

- A new detector at the secondary queue of the Grove Hill southbound approach; or
- An increase of the extension time for the southbound stage.

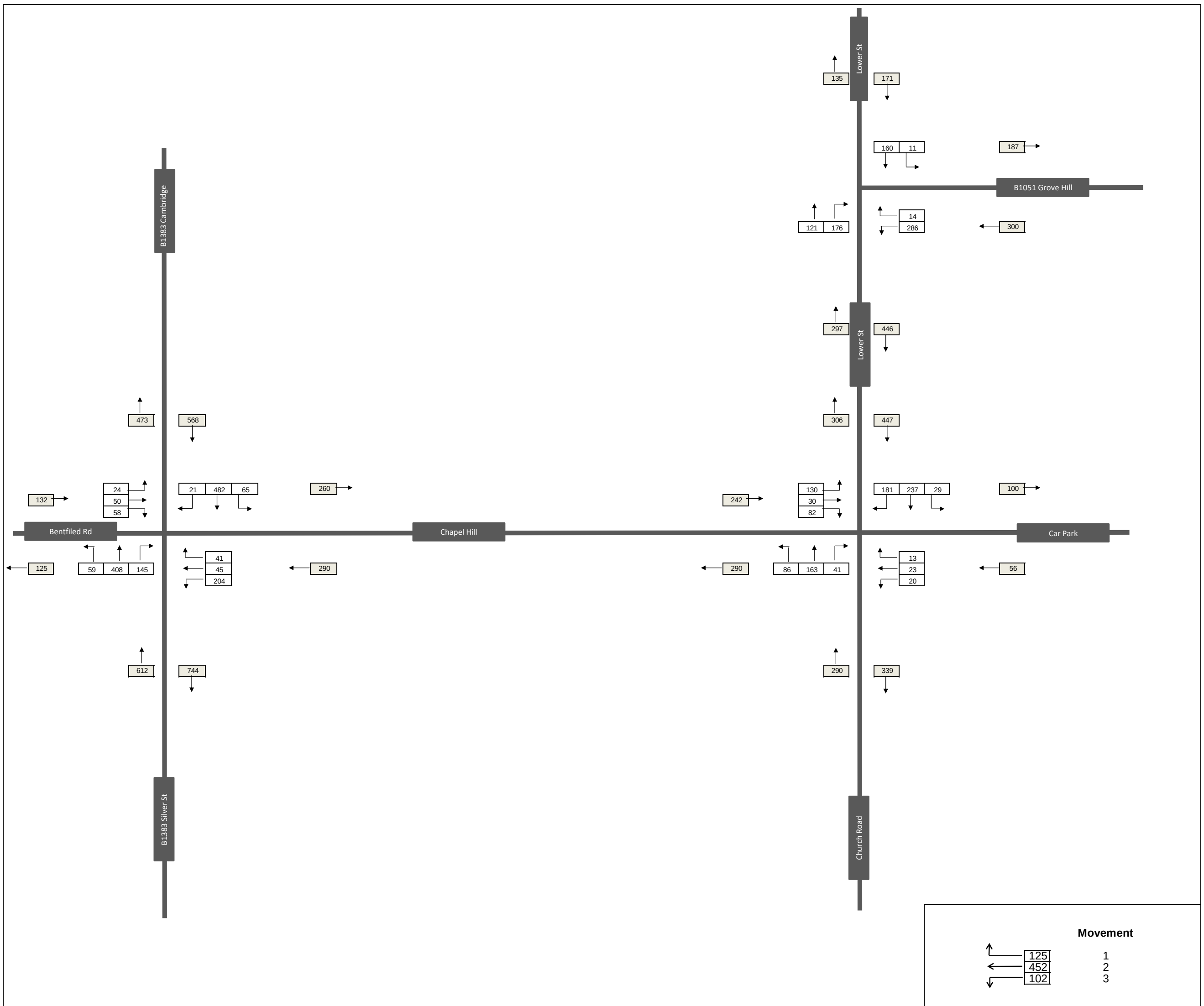
12.4. The aim of these mitigation proposals is to avoid gap-changes of the southbound stage when demand is present at the secondary queue and allow these vehicles to proceed with less delay. Besides, maximum green times in both mitigations have been revised to take into account the additional demand in the forecast year.

12.5. The results show that both mitigations manage to greatly reduce the queue lengths and delays at the Grove Hill southbound approach and improve the westbound journey times through Stansted Mountfitchet. It has been demonstrated that the proposed mitigations not only remove the effect of the additional traffic related to the proposed development, but also mitigates part of the traffic impact related to the committed developments.

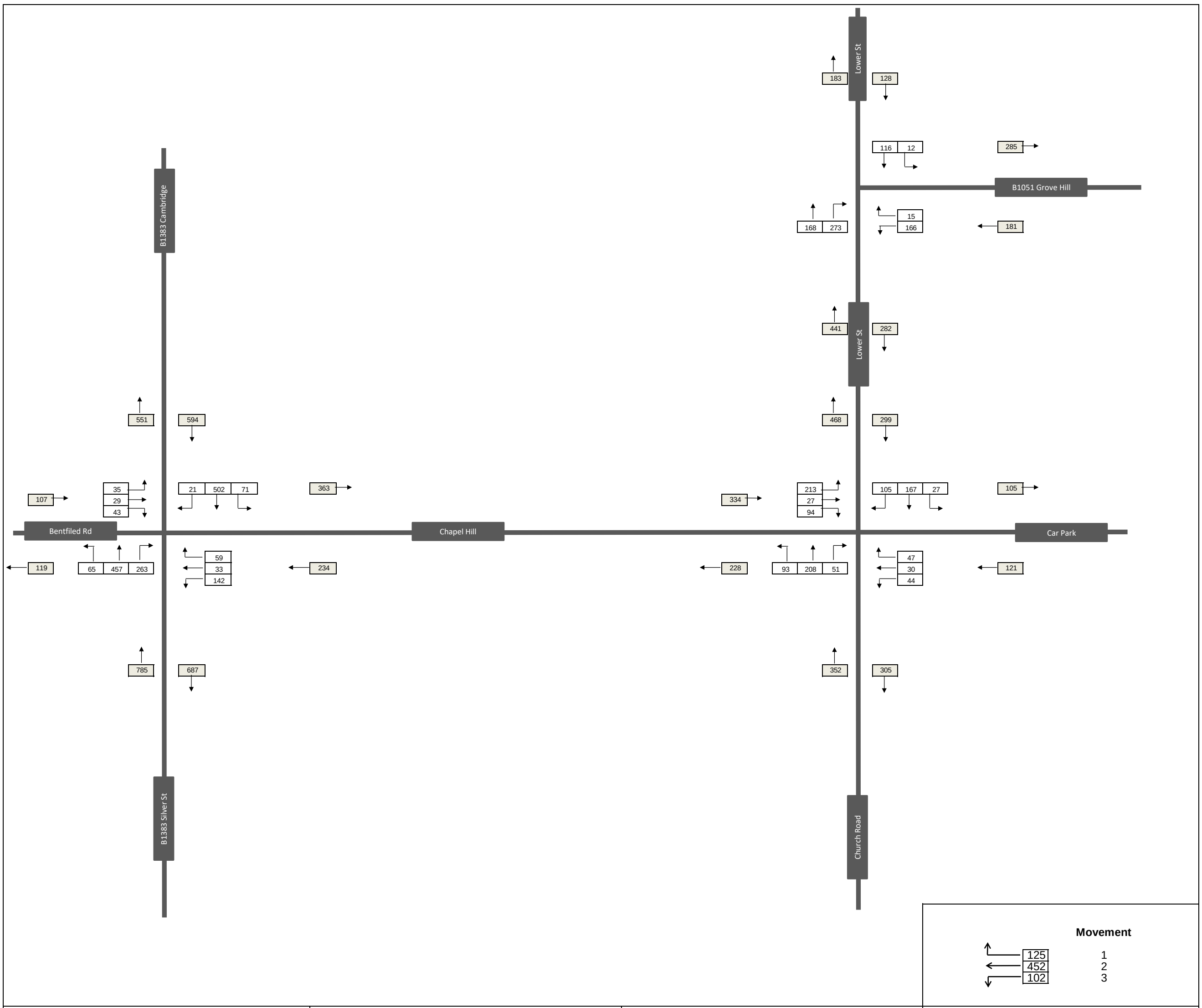
12.6. The implementation of the mitigations results in slight increases of queue lengths at the Silver Street / Chapel Hill junction, the Chapel Hill mini roundabout and the northbound approach to the Grove Hill signalised junction. However, the magnitude of these changes is not comparable to the significant improvement observed at the southbound approach to the Grove Hill signalised junction, which has a known queuing problem.

12.7. WSP recommends the mitigation proposal “A: new detector”. Apart from achieving overall a slightly better result than the mitigation proposal “B: increased southbound extension”, it provides extra confidence that demand from vehicles at the secondary queue is recorded.

APPENDIX A – NETWORK FLOW DIAGRAM



Title:	Client:	Date:
2018 AM Base Year	Fairfield Ltd	21/01/2019
Time Period:	**Project:**	**Reference:**
08:00-09:00	Land East of Elsenham	11500582



Title:	Client:	Date:
2018 PM Base Year	Fairfield Ltd	21/01/2019
Time Period:	**Project:**	**Reference:**
17:00-18:00	Land East of Elsenham	11500582

APPENDIX B – BASE YEAR MODEL VALIDATION

Vehicle Flow Information
Calibration Statistics
All Vehicles
AM Peak

Index	Junction	Name	Origin	Destination	Reference	Observed Flow	Modelled Flow	Difference	% Difference	G.E.H. Value (using hourly flows)	Flow Test (using hourly flows)
1	10	mbridge Road / Silver Street / Chapel	Cambridge Roa	B1051 (E)	10:2:3	65	63	-2	-3.2%	0.3	Pass Low
2	10	mbridge Road / Silver Street / Chapel	Cambridge Roa	Silver Street	10:2:2	482	483	1	0.3%	0.1	Pass Low
3	10	mbridge Road / Silver Street / Chapel	Cambridge Roa	Bentfield Road	10:2:22	21	21	-1	-2.4%	0.1	Pass Low
4	10	mbridge Road / Silver Street / Chapel	B1051 (E)	Silver Street	10:23:2	204	196	-8	-4.1%	0.6	Pass Low
5	10	mbridge Road / Silver Street / Chapel	B1051 (E)	Bentfield Road	10:23:22	44	47	3	7.3%	0.5	Pass Low
6	10	mbridge Road / Silver Street / Chapel	B1051 (E)	Cambridge Roa	10:23:1	41	39	-2	-5.9%	0.4	Pass Low
7	10	mbridge Road / Silver Street / Chapel	Silver Street	Bentfield Road	10:1:22	59	57	-2	-3.6%	0.3	Pass Low
8	10	mbridge Road / Silver Street / Chapel	Silver Street	Cambridge Roa	10:1:1	408	405	-3	-0.7%	0.2	Pass Low
9	10	mbridge Road / Silver Street / Chapel	Silver Street	B1051 (E)	10:1:3	145	145	0	-0.3%	0.0	Pass Low
10	10	mbridge Road / Silver Street / Chapel	Bentfield Road	Cambridge Roa	10:21:1	24	24	0	-0.2%	0.0	Pass Low
11	10	mbridge Road / Silver Street / Chapel	Bentfield Road	B1051 (E)	10:21:3	48	47	-1	-2.3%	0.2	Pass Low
12	10	mbridge Road / Silver Street / Chapel	Bentfield Road	Silver Street	10:21:2	58	60	2	2.6%	0.2	Pass Low
13	5	Chapel Hill / Station Road / B1051	B1051 (N)	Castle	5:39:15	29	28	-1	-3.1%	0.2	Pass Low
14	5	Chapel Hill / Station Road / B1051	B1051 (N)	Church Road	5:39:29	228	225	-3	-1.4%	0.2	Pass Low
15	5	Chapel Hill / Station Road / B1051	B1051 (N)	Station Road	5:39:14	8	8	-1	-6.8%	0.2	Pass Low
16	5	Chapel Hill / Station Road / B1051	B1051 (N)	B1051 (W)	5:39:30	179	173	-6	-3.4%	0.5	Pass Low
17	5	Chapel Hill / Station Road / B1051	Castle	Church Road	5:16:29	18	18	0	-1.5%	0.1	Pass Low
18	5	Chapel Hill / Station Road / B1051	Castle	Station Road	5:16:14	2	2	0	-4.0%	0.1	Pass Low
19	5	Chapel Hill / Station Road / B1051	Castle	B1051 (W)	5:16:30	23	23	0	1.7%	0.1	Pass Low
20	5	Chapel Hill / Station Road / B1051	Castle	B1051 (N)	5:16:9	13	13	0	-1.5%	0.1	Pass Low
21	5	Chapel Hill / Station Road / B1051	Church Road	Station Road	5:4:14	22	23	1	2.7%	0.1	Pass Low
22	5	Chapel Hill / Station Road / B1051	Church Road	B1051 (W)	5:4:30	81	82	1	1.2%	0.1	Pass Low
23	5	Chapel Hill / Station Road / B1051	Church Road	B1051 (N)	5:4:9	159	156	-3	-1.8%	0.2	Pass Low
24	5	Chapel Hill / Station Road / B1051	Church Road	Castle	5:4:15	40	38	-2	-4.1%	0.3	Pass Low
25	5	Chapel Hill / Station Road / B1051	Station Road	B1051 (W)	5:13:30	5	3	-2	-35.6%	0.9	Pass Low
26	5	Chapel Hill / Station Road / B1051	Station Road	B1051 (N)	5:13:9	4	4	0	-4.3%	0.1	Pass Low
27	5	Chapel Hill / Station Road / B1051	Station Road	Castle	5:13:15	1	1	0	-32.5%	0.4	Pass Low
28	5	Chapel Hill / Station Road / B1051	Station Road	Church Road	5:13:29	7	8	1	7.9%	0.2	Pass Low
29	5	Chapel Hill / Station Road / B1051	B1051 (W)	B1051 (N)	5:5:9	130	136	6	4.8%	0.5	Pass Low
30	5	Chapel Hill / Station Road / B1051	B1051 (W)	Castle	5:5:15	30	32	2	6.0%	0.3	Pass Low
31	5	Chapel Hill / Station Road / B1051	B1051 (W)	Church Road	5:5:29	72	73	1	1.6%	0.1	Pass Low
32	5	Chapel Hill / Station Road / B1051	B1051 (W)	Station Road	5:5:14	10	11	0	2.9%	0.1	Pass Low
33	4	Lower Street / B1051	Lower Street	B1051 (N)	4:11:18	11	11	0	2.3%	0.1	Pass Low
34	4	Lower Street / B1051	Lower Street	B1051 (S)	4:11:39	159	157	-2	-1.3%	0.2	Pass Low
35	4	Lower Street / B1051	B1051 (N)	B1051 (S)	4:40:39	283	276	-7	-2.5%	0.4	Pass Low
36	4	Lower Street / B1051	B1051 (N)	Lower Street	4:40:10	14	13	-1	-5.0%	0.2	Pass Low
37	4	Lower Street / B1051	B1051 (S)	Lower Street	4:10:10	121	131	10	8.3%	0.9	Pass Low
38	4	Lower Street / B1051	B1051 (S)	B1051 (N)	4:9:18	176	176	0	0.1%	0.0	Pass Low

	Sum Obs.	Sum Mod.	Diff	% Diff	Ave. GEH
Overall Stats	3424	3405	-19	-0.6%	0.2

Vehicle Flow Information
Calibration Statistics
Heavy Vehicles
AM Peak

Index	Junction	Name	Origin	Destination	Reference	Observed Flow	Modelled Flow	Difference	% Difference	G.E.H. Value (using hourly flows)	Flow Test (using hourly flows)
1	10	mbridge Road / Silver Street / Chapel	Cambridge Road	B1051 (E)	10:2:3	4	4	0	-10.0%	0.2	Pass Low
2	10	mbridge Road / Silver Street / Chapel	Cambridge Road	Silver Street	10:2:2	30	32	2	5.5%	0.3	Pass Low
3	10	mbridge Road / Silver Street / Chapel	Cambridge Road	Bentfield Road	10:2:22	0	0	0		0.0	Pass Low
4	10	mbridge Road / Silver Street / Chapel	B1051 (E)	Silver Street	10:23:2	4	4	0	-8.7%	0.2	Pass Low
5	10	mbridge Road / Silver Street / Chapel	B1051 (E)	Bentfield Road	10:23:22	2	1	-1	-35.0%	0.5	Pass Low
6	10	mbridge Road / Silver Street / Chapel	B1051 (E)	Cambridge Road	10:23:1	3	3	0	-13.3%	0.2	Pass Low
7	10	mbridge Road / Silver Street / Chapel	Silver Street	Bentfield Road	10:1:22	3	3	0	0.0%	0.0	Pass Low
8	10	mbridge Road / Silver Street / Chapel	Silver Street	Cambridge Road	10:1:1	45	46	1	1.7%	0.1	Pass Low
9	10	mbridge Road / Silver Street / Chapel	Silver Street	B1051 (E)	10:1:3	10	10	0	2.5%	0.1	Pass Low
10	10	mbridge Road / Silver Street / Chapel	Bentfield Road	Cambridge Road	10:21:1	1	2	1	50.0%	0.4	Pass Low
11	10	mbridge Road / Silver Street / Chapel	Bentfield Road	B1051 (E)	10:21:3	1	1	0	0.0%	0.0	Pass Low
12	10	mbridge Road / Silver Street / Chapel	Bentfield Road	Silver Street	10:21:2	3	3	0	-10.0%	0.2	Pass Low
13	5	Chapel Hill / Station Road / B1051	B1051 (N)	Castle	5:39:15	0	0	0		0.0	Pass Low
14	5	Chapel Hill / Station Road / B1051	B1051 (N)	Church Road	5:39:29	11	10	-1	-10.9%	0.4	Pass Low
15	5	Chapel Hill / Station Road / B1051	B1051 (N)	Station Road	5:39:14	0	0	0		0.0	Pass Low
16	5	Chapel Hill / Station Road / B1051	B1051 (N)	B1051 (W)	5:39:30	4	3	-1	-15.0%	0.3	Pass Low
17	5	Chapel Hill / Station Road / B1051	Castle	Church Road	5:16:29	0	0	0		0.0	Pass Low
18	5	Chapel Hill / Station Road / B1051	Castle	Station Road	5:16:14	0	0	0		0.0	Pass Low
19	5	Chapel Hill / Station Road / B1051	Castle	B1051 (W)	5:16:30	1	1	0	0.0%	0.0	Pass Low
20	5	Chapel Hill / Station Road / B1051	Castle	B1051 (N)	5:16:9	0	0	0		0.0	Pass Low
21	5	Chapel Hill / Station Road / B1051	Church Road	Station Road	5:4:14	0	0	0		0.0	Pass Low
22	5	Chapel Hill / Station Road / B1051	Church Road	B1051 (W)	5:4:30	3	3	0	10.0%	0.2	Pass Low
23	5	Chapel Hill / Station Road / B1051	Church Road	B1051 (N)	5:4:9	8	9	1	10.0%	0.3	Pass Low
24	5	Chapel Hill / Station Road / B1051	Church Road	Castle	5:4:15	0	0	0		0.0	Pass Low
25	5	Chapel Hill / Station Road / B1051	Station Road	B1051 (W)	5:13:30	0	0	0		0.0	Pass Low
26	5	Chapel Hill / Station Road / B1051	Station Road	B1051 (N)	5:13:9	0	0	0		0.0	Pass Low
27	5	Chapel Hill / Station Road / B1051	Station Road	Castle	5:13:15	0	0	0		0.0	Pass Low
28	5	Chapel Hill / Station Road / B1051	Station Road	Church Road	5:13:29	0	0	0		0.0	Pass Low
29	5	Chapel Hill / Station Road / B1051	B1051 (W)	B1051 (N)	5:5:9	7	6	-2	-21.4%	0.6	Pass Low
30	5	Chapel Hill / Station Road / B1051	B1051 (W)	Castle	5:5:15	1	1	0	-25.0%	0.3	Pass Low
31	5	Chapel Hill / Station Road / B1051	B1051 (W)	Church Road	5:5:29	7	8	1	19.3%	0.5	Pass Low
32	5	Chapel Hill / Station Road / B1051	B1051 (W)	Station Road	5:5:14	0	0	0		0.0	Pass Low
33	4	Lower Street / B1051	Lower Street	B1051 (N)	4:11:18	0	0	0		0.0	Pass Low
34	4	Lower Street / B1051	Lower Street	B1051 (S)	4:11:39	6	6	0	-6.7%	0.2	Pass Low
35	4	Lower Street / B1051	B1051 (N)	B1051 (S)	4:40:39	8	8	0	-4.4%	0.1	Pass Low
36	4	Lower Street / B1051	B1051 (N)	Lower Street	4:40:10	0	0	0		0.0	Pass Low
37	4	Lower Street / B1051	B1051 (S)	Lower Street	4:10:10	4	5	1	16.3%	0.3	Pass Low
38	4	Lower Street / B1051	B1051 (S)	B1051 (N)	4:9:18	10	10	0	-4.0%	0.1	Pass Low

	Sum Obs.	Sum Mod.	Diff	% Diff	Ave. GEH
Overall Stats	176	175	-1	-0.3%	0.1

Vehicle Flow Information
Calibration Statistics
Light Vehicles
AM Peak

Index	Junction	Name	Origin	Destination	Reference	Observed Flow	Modelled Flow	Difference	% Difference	G.E.H. Value (using hourly flows)	Flow Test (using hourly flows)
1	10	mbridge Road / Silver Street / Chapel	Cambridge Road	B1051 (E)	10:2:3	61	59	-2	-2.7%	0.2	Pass Low
2	10	mbridge Road / Silver Street / Chapel	Cambridge Road	Silver Street	10:2:2	452	452	0	-0.1%	0.0	Pass Low
3	10	mbridge Road / Silver Street / Chapel	Cambridge Road	Bentfield Road	10:2:22	21	21	-1	-2.4%	0.1	Pass Low
4	10	mbridge Road / Silver Street / Chapel	B1051 (E)	Silver Street	10:23:2	200	192	-8	-4.0%	0.6	Pass Low
5	10	mbridge Road / Silver Street / Chapel	B1051 (E)	Bentfield Road	10:23:22	42	46	4	9.3%	0.6	Pass Low
6	10	mbridge Road / Silver Street / Chapel	B1051 (E)	Cambridge Road	10:23:1	38	36	-2	-5.3%	0.3	Pass Low
7	10	mbridge Road / Silver Street / Chapel	Silver Street	Bentfield Road	10:1:22	56	54	-2	-3.8%	0.3	Pass Low
8	10	mbridge Road / Silver Street / Chapel	Silver Street	Cambridge Road	10:1:1	363	359	-4	-1.0%	0.2	Pass Low
9	10	mbridge Road / Silver Street / Chapel	Silver Street	B1051 (E)	10:1:3	135	134	-1	-0.5%	0.1	Pass Low
10	10	mbridge Road / Silver Street / Chapel	Bentfield Road	Cambridge Road	10:21:1	23	22	-1	-2.4%	0.1	Pass Low
11	10	mbridge Road / Silver Street / Chapel	Bentfield Road	B1051 (E)	10:21:3	47	46	-1	-2.3%	0.2	Pass Low
12	10	mbridge Road / Silver Street / Chapel	Bentfield Road	Silver Street	10:21:2	55	57	2	3.3%	0.2	Pass Low
13	5	Chapel Hill / Station Road / B1051	B1051 (N)	Castle	5:39:15	29	28	-1	-3.1%	0.2	Pass Low
14	5	Chapel Hill / Station Road / B1051	B1051 (N)	Church Road	5:39:29	217	215	-2	-0.9%	0.1	Pass Low
15	5	Chapel Hill / Station Road / B1051	B1051 (N)	Station Road	5:39:14	8	8	-1	-6.8%	0.2	Pass Low
16	5	Chapel Hill / Station Road / B1051	B1051 (N)	B1051 (W)	5:39:30	175	170	-5	-3.1%	0.4	Pass Low
17	5	Chapel Hill / Station Road / B1051	Castle	Church Road	5:16:29	18	18	0	-1.5%	0.1	Pass Low
18	5	Chapel Hill / Station Road / B1051	Castle	Station Road	5:16:14	2	2	0	-4.0%	0.1	Pass Low
19	5	Chapel Hill / Station Road / B1051	Castle	B1051 (W)	5:16:30	22	22	0	1.8%	0.1	Pass Low
20	5	Chapel Hill / Station Road / B1051	Castle	B1051 (N)	5:16:9	13	13	0	-1.5%	0.1	Pass Low
21	5	Chapel Hill / Station Road / B1051	Church Road	Station Road	5:4:14	22	23	1	2.7%	0.1	Pass Low
22	5	Chapel Hill / Station Road / B1051	Church Road	B1051 (W)	5:4:30	78	79	1	0.9%	0.1	Pass Low
23	5	Chapel Hill / Station Road / B1051	Church Road	B1051 (N)	5:4:9	151	147	-4	-2.4%	0.3	Pass Low
24	5	Chapel Hill / Station Road / B1051	Church Road	Castle	5:4:15	40	38	-2	-4.1%	0.3	Pass Low
25	5	Chapel Hill / Station Road / B1051	Station Road	B1051 (W)	5:13:30	5	3	-2	-35.6%	0.9	Pass Low
26	5	Chapel Hill / Station Road / B1051	Station Road	B1051 (N)	5:13:9	4	4	0	-4.3%	0.1	Pass Low
27	5	Chapel Hill / Station Road / B1051	Station Road	Castle	5:13:15	1	1	0	-32.5%	0.4	Pass Low
28	5	Chapel Hill / Station Road / B1051	Station Road	Church Road	5:13:29	7	8	1	7.9%	0.2	Pass Low
29	5	Chapel Hill / Station Road / B1051	B1051 (W)	B1051 (N)	5:5:9	123	131	8	6.3%	0.7	Pass Low
30	5	Chapel Hill / Station Road / B1051	B1051 (W)	Castle	5:5:15	29	31	2	7.1%	0.4	Pass Low
31	5	Chapel Hill / Station Road / B1051	B1051 (W)	Church Road	5:5:29	65	64	0	-0.3%	0.0	Pass Low
32	5	Chapel Hill / Station Road / B1051	B1051 (W)	Station Road	5:5:14	10	11	0	2.9%	0.1	Pass Low
33	4	Lower Street / B1051	Lower Street	B1051 (N)	4:11:18	11	11	0	2.3%	0.1	Pass Low
34	4	Lower Street / B1051	Lower Street	B1051 (S)	4:11:39	153	151	-2	-1.1%	0.1	Pass Low
35	4	Lower Street / B1051	B1051 (N)	B1051 (S)	4:40:39	275	268	-7	-2.4%	0.4	Pass Low
36	4	Lower Street / B1051	B1051 (N)	Lower Street	4:40:10	14	13	-1	-5.0%	0.2	Pass Low
37	4	Lower Street / B1051	B1051 (S)	Lower Street	4:10:10	117	126	9	8.0%	0.8	Pass Low
38	4	Lower Street / B1051	B1051 (S)	B1051 (N)	4:9:18	166	167	1	0.3%	0.0	Pass Low

	Sum Obs.	Sum Mod.	Diff	% Diff	Ave. GEH
Overall Stats	3248	3229	-19	-0.6%	0.2

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Index	Junction	Name	Origin	Destination	Reference	Observed Flow	Modelled Flow	Difference	% Difference	G.E.H. Value (using hourly flows)	Flow Test (using hourly flows)
1	10	mbridge Road / Silver Street / Chapel	Cambridge Road	B1051 (E)	10:2:3	71	68	-3	-3.9%	0.3	Pass Low
2	10	mbridge Road / Silver Street / Chapel	Cambridge Road	Silver Street	10:2:2	502	504	2	0.4%	0.1	Pass Low
3	10	mbridge Road / Silver Street / Chapel	Cambridge Road	Bentfield Road	10:2:22	21	20	-1	-3.1%	0.1	Pass Low
4	10	mbridge Road / Silver Street / Chapel	B1051 (E)	Silver Street	10:23:2	142	129	-13	-9.0%	1.1	Pass Low
5	10	mbridge Road / Silver Street / Chapel	B1051 (E)	Bentfield Road	10:23:22	31	30	-1	-2.4%	0.1	Pass Low
6	10	mbridge Road / Silver Street / Chapel	B1051 (E)	Cambridge Road	10:23:1	59	57	-2	-3.1%	0.2	Pass Low
7	10	mbridge Road / Silver Street / Chapel	Silver Street	Bentfield Road	10:1:22	65	65	0	0.2%	0.0	Pass Low
8	10	mbridge Road / Silver Street / Chapel	Silver Street	Cambridge Road	10:1:1	455	451	-4	-0.9%	0.2	Pass Low
9	10	mbridge Road / Silver Street / Chapel	Silver Street	B1051 (E)	10:1:3	263	261	-2	-0.7%	0.1	Pass Low
10	10	mbridge Road / Silver Street / Chapel	Bentfield Road	Cambridge Road	10:21:1	35	33	-2	-4.7%	0.3	Pass Low
11	10	mbridge Road / Silver Street / Chapel	Bentfield Road	B1051 (E)	10:21:3	29	29	0	-1.4%	0.1	Pass Low
12	10	mbridge Road / Silver Street / Chapel	Bentfield Road	Silver Street	10:21:2	43	43	0	0.8%	0.1	Pass Low
13	5	Chapel Hill / Station Road / B1051	B1051 (N)	Castle	5:39:15	27	24	-3	-10.2%	0.5	Pass Low
14	5	Chapel Hill / Station Road / B1051	B1051 (N)	Church Road	5:39:29	158	148	-10	-6.3%	0.8	Pass Low
15	5	Chapel Hill / Station Road / B1051	B1051 (N)	Station Road	5:39:14	8	7	-1	-9.5%	0.3	Pass Low
16	5	Chapel Hill / Station Road / B1051	B1051 (N)	B1051 (W)	5:39:30	104	93	-11	-10.4%	1.1	Pass Low
17	5	Chapel Hill / Station Road / B1051	Castle	Church Road	5:16:29	41	43	2	4.5%	0.3	Pass Low
18	5	Chapel Hill / Station Road / B1051	Castle	Station Road	5:16:14	3	2	-1	-19.1%	0.3	Pass Low
19	5	Chapel Hill / Station Road / B1051	Castle	B1051 (W)	5:16:30	30	29	-1	-2.7%	0.1	Pass Low
20	5	Chapel Hill / Station Road / B1051	Castle	B1051 (N)	5:16:9	47	46	-2	-3.2%	0.2	Pass Low
21	5	Chapel Hill / Station Road / B1051	Church Road	Station Road	5:4:14	22	21	-1	-2.5%	0.1	Pass Low
22	5	Chapel Hill / Station Road / B1051	Church Road	B1051 (W)	5:4:30	81	84	2	3.0%	0.3	Pass Low
23	5	Chapel Hill / Station Road / B1051	Church Road	B1051 (N)	5:4:9	192	191	-1	-0.4%	0.1	Pass Low
24	5	Chapel Hill / Station Road / B1051	Church Road	Castle	5:4:15	47	45	-2	-4.0%	0.3	Pass Low
25	5	Chapel Hill / Station Road / B1051	Station Road	B1051 (W)	5:13:30	11	10	-1	-4.9%	0.2	Pass Low
26	5	Chapel Hill / Station Road / B1051	Station Road	B1051 (N)	5:13:9	13	13	0	-2.7%	0.1	Pass Low
27	5	Chapel Hill / Station Road / B1051	Station Road	Castle	5:13:15	3	3	0	4.9%	0.1	Pass Low
28	5	Chapel Hill / Station Road / B1051	Station Road	Church Road	5:13:29	35	32	-3	-7.3%	0.4	Pass Low
29	5	Chapel Hill / Station Road / B1051	B1051 (W)	B1051 (N)	5:5:9	212	233	21	9.9%	1.4	Pass Low
30	5	Chapel Hill / Station Road / B1051	B1051 (W)	Castle	5:5:15	27	29	2	7.2%	0.4	Pass Low
31	5	Chapel Hill / Station Road / B1051	B1051 (W)	Church Road	5:5:29	81	86	5	5.5%	0.5	Pass Low
32	5	Chapel Hill / Station Road / B1051	B1051 (W)	Station Road	5:5:14	13	13	0	2.7%	0.1	Pass Low
33	4	Lower Street / B1051	Lower Street	B1051 (N)	4:11:18	12	12	0	-2.1%	0.1	Pass Low
34	4	Lower Street / B1051	Lower Street	B1051 (S)	4:11:39	115	114	-1	-0.7%	0.1	Pass Low
35	4	Lower Street / B1051	B1051 (N)	B1051 (S)	4:40:39	165	159	-6	-3.7%	0.5	Pass Low
36	4	Lower Street / B1051	B1051 (N)	Lower Street	4:40:10	15	14	-1	-4.7%	0.2	Pass Low
37	4	Lower Street / B1051	B1051 (S)	Lower Street	4:10:10	166	184	18	11.0%	1.4	Pass Low
38	4	Lower Street / B1051	B1051 (S)	B1051 (N)	4:9:18	270	298	28	10.5%	1.7	Pass Low

	Sum Obs.	Sum Mod.	Diff	% Diff	Ave. GEH
Overall Stats	3614	3627	13	0.4%	0.4

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Index	Junction	Name	Origin	Destination	Reference	Observed Flow	Modelled Flow	Difference	% Difference	G.E.H. Value (using hourly flows)	Flow Test (using hourly flows)
1	10	mbridge Road / Silver Street / Chapel	Cambridge Road	B1051 (E)	10:2:3	2	2	0	-17.5%	0.3	Pass Low
2	10	mbridge Road / Silver Street / Chapel	Cambridge Road	Silver Street	10:2:2	14	18	4	27.1%	1.0	Pass Low
3	10	mbridge Road / Silver Street / Chapel	Cambridge Road	Bentfield Road	10:2:22	1	1	0	-30.0%	0.3	Pass Low
4	10	mbridge Road / Silver Street / Chapel	B1051 (E)	Silver Street	10:23:2	4	3	-1	-21.3%	0.4	Pass Low
5	10	mbridge Road / Silver Street / Chapel	B1051 (E)	Bentfield Road	10:23:22	1	1	0	20.0%	0.2	Pass Low
6	10	mbridge Road / Silver Street / Chapel	B1051 (E)	Cambridge Road	10:23:1	0	0	0		0.0	Pass Low
7	10	mbridge Road / Silver Street / Chapel	Silver Street	Bentfield Road	10:1:22	1	1	0	0.0%	0.0	Pass Low
8	10	mbridge Road / Silver Street / Chapel	Silver Street	Cambridge Road	10:1:1	7	9	2	22.1%	0.6	Pass Low
9	10	mbridge Road / Silver Street / Chapel	Silver Street	B1051 (E)	10:1:3	5	5	0	8.0%	0.2	Pass Low
10	10	mbridge Road / Silver Street / Chapel	Bentfield Road	Cambridge Road	10:21:1	2	2	0	-5.0%	0.1	Pass Low
11	10	mbridge Road / Silver Street / Chapel	Bentfield Road	B1051 (E)	10:21:3	1	1	0	10.0%	0.1	Pass Low
12	10	mbridge Road / Silver Street / Chapel	Bentfield Road	Silver Street	10:21:2	0	0	0		0.0	Pass Low
13	5	Chapel Hill / Station Road / B1051	B1051 (N)	Castle	5:39:15	0	0	0		0.7	Pass Low
14	5	Chapel Hill / Station Road / B1051	B1051 (N)	Church Road	5:39:29	2	3	1	60.0%	0.7	Pass Low
15	5	Chapel Hill / Station Road / B1051	B1051 (N)	Station Road	5:39:14	0	0	0		0.0	Pass Low
16	5	Chapel Hill / Station Road / B1051	B1051 (N)	B1051 (W)	5:39:30	3	2	-1	-18.3%	0.3	Pass Low
17	5	Chapel Hill / Station Road / B1051	Castle	Church Road	5:16:29	0	0	0		0.0	Pass Low
18	5	Chapel Hill / Station Road / B1051	Castle	Station Road	5:16:14	0	0	0		0.0	Pass Low
19	5	Chapel Hill / Station Road / B1051	Castle	B1051 (W)	5:16:30	0	0	0		0.0	Pass Low
20	5	Chapel Hill / Station Road / B1051	Castle	B1051 (N)	5:16:9	0	0	0		0.0	Pass Low
21	5	Chapel Hill / Station Road / B1051	Church Road	Station Road	5:4:14	0	0	0		0.0	Pass Low
22	5	Chapel Hill / Station Road / B1051	Church Road	B1051 (W)	5:4:30	1	2	1	100.0%	0.8	Pass Low
23	5	Chapel Hill / Station Road / B1051	Church Road	B1051 (N)	5:4:9	2	3	1	45.0%	0.6	Pass Low
24	5	Chapel Hill / Station Road / B1051	Church Road	Castle	5:4:15	0	0	0		0.0	Pass Low
25	5	Chapel Hill / Station Road / B1051	Station Road	B1051 (W)	5:13:30	0	0	0		0.0	Pass Low
26	5	Chapel Hill / Station Road / B1051	Station Road	B1051 (N)	5:13:9	0	0	0		0.0	Pass Low
27	5	Chapel Hill / Station Road / B1051	Station Road	Castle	5:13:15	0	0	0		0.0	Pass Low
28	5	Chapel Hill / Station Road / B1051	Station Road	Church Road	5:13:29	0	0	0		0.0	Pass Low
29	5	Chapel Hill / Station Road / B1051	B1051 (W)	B1051 (N)	5:5:9	3	5	2	68.3%	1.0	Pass Low
30	5	Chapel Hill / Station Road / B1051	B1051 (W)	Castle	5:5:15	0	0	0		0.0	Pass Low
31	5	Chapel Hill / Station Road / B1051	B1051 (W)	Church Road	5:5:29	2	3	1	52.5%	0.7	Pass Low
32	5	Chapel Hill / Station Road / B1051	B1051 (W)	Station Road	5:5:14	0	0	0		0.0	Pass Low
33	4	Lower Street / B1051	Lower Street	B1051 (N)	4:11:18	1	1	0	-5.0%	0.1	Pass Low
34	4	Lower Street / B1051	Lower Street	B1051 (S)	4:11:39	1	1	0	-5.0%	0.1	Pass Low
35	4	Lower Street / B1051	B1051 (N)	B1051 (S)	4:40:39	4	5	1	28.8%	0.5	Pass Low
36	4	Lower Street / B1051	B1051 (N)	Lower Street	4:40:10	0	0	0		0.7	Pass Low
37	4	Lower Street / B1051	B1051 (S)	Lower Street	4:10:10	2	3	1	25.0%	0.3	Pass Low
38	4	Lower Street / B1051	B1051 (S)	B1051 (N)	4:9:18	2	5	3	167.5%	1.7	Pass Low

	Sum Obs.	Sum Mod.	Diff	% Diff	Ave. GEH
Overall Stats	61	77	16	25.4%	0.3

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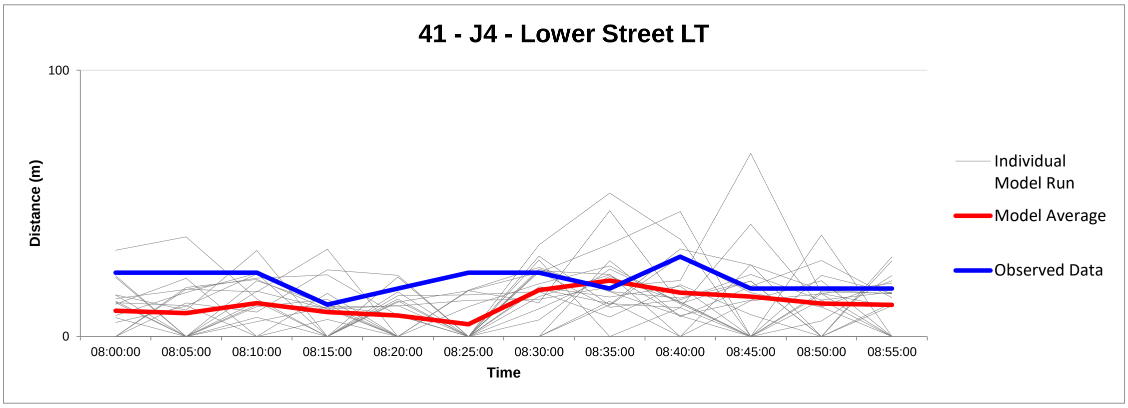
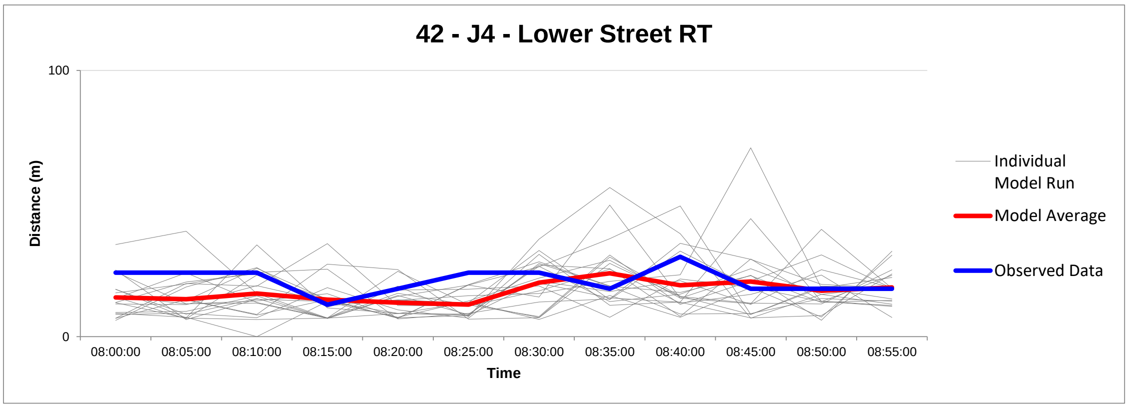
Index	Junction	Name	Origin	Destination	Reference	Observed Flow	Modelled Flow	Difference	% Difference	G.E.H. Value (using hourly flows)	Flow Test (using hourly flows)
1	10	mbridge Road / Silver Street / Chapel	Cambridge Road	B1051 (E)	10:2:3	69	67	-2	-3.6%	0.3	Pass Low
2	10	mbridge Road / Silver Street / Chapel	Cambridge Road	Silver Street	10:2:2	488	486	-2	-0.4%	0.1	Pass Low
3	10	mbridge Road / Silver Street / Chapel	Cambridge Road	Bentfield Road	10:2:22	20	20	0	-1.7%	0.1	Pass Low
4	10	mbridge Road / Silver Street / Chapel	B1051 (E)	Silver Street	10:23:2	138	126	-12	-8.6%	1.0	Pass Low
5	10	mbridge Road / Silver Street / Chapel	B1051 (E)	Bentfield Road	10:23:22	30	29	-1	-3.2%	0.2	Pass Low
6	10	mbridge Road / Silver Street / Chapel	B1051 (E)	Cambridge Road	10:23:1	59	57	-2	-3.1%	0.2	Pass Low
7	10	mbridge Road / Silver Street / Chapel	Silver Street	Bentfield Road	10:1:22	64	64	0	0.2%	0.0	Pass Low
8	10	mbridge Road / Silver Street / Chapel	Silver Street	Cambridge Road	10:1:1	448	443	-6	-1.2%	0.3	Pass Low
9	10	mbridge Road / Silver Street / Chapel	Silver Street	B1051 (E)	10:1:3	258	256	-2	-0.9%	0.1	Pass Low
10	10	mbridge Road / Silver Street / Chapel	Bentfield Road	Cambridge Road	10:21:1	33	31	-2	-4.7%	0.3	Pass Low
11	10	mbridge Road / Silver Street / Chapel	Bentfield Road	B1051 (E)	10:21:3	28	28	-1	-1.8%	0.1	Pass Low
12	10	mbridge Road / Silver Street / Chapel	Bentfield Road	Silver Street	10:21:2	43	43	0	0.8%	0.1	Pass Low
13	5	Chapel Hill / Station Road / B1051	B1051 (N)	Castle	5:39:15	27	24	-3	-11.1%	0.6	Pass Low
14	5	Chapel Hill / Station Road / B1051	B1051 (N)	Church Road	5:39:29	156	145	-11	-7.1%	0.9	Pass Low
15	5	Chapel Hill / Station Road / B1051	B1051 (N)	Station Road	5:39:14	8	7	-1	-9.5%	0.3	Pass Low
16	5	Chapel Hill / Station Road / B1051	B1051 (N)	B1051 (W)	5:39:30	101	91	-10	-10.1%	1.0	Pass Low
17	5	Chapel Hill / Station Road / B1051	Castle	Church Road	5:16:29	41	43	2	4.5%	0.3	Pass Low
18	5	Chapel Hill / Station Road / B1051	Castle	Station Road	5:16:14	3	2	-1	-19.1%	0.3	Pass Low
19	5	Chapel Hill / Station Road / B1051	Castle	B1051 (W)	5:16:30	30	29	-1	-2.7%	0.1	Pass Low
20	5	Chapel Hill / Station Road / B1051	Castle	B1051 (N)	5:16:9	47	46	-2	-3.2%	0.2	Pass Low
21	5	Chapel Hill / Station Road / B1051	Church Road	Station Road	5:4:14	22	21	-1	-2.5%	0.1	Pass Low
22	5	Chapel Hill / Station Road / B1051	Church Road	B1051 (W)	5:4:30	80	82	1	1.8%	0.2	Pass Low
23	5	Chapel Hill / Station Road / B1051	Church Road	B1051 (N)	5:4:9	190	188	-2	-0.9%	0.1	Pass Low
24	5	Chapel Hill / Station Road / B1051	Church Road	Castle	5:4:15	47	45	-2	-4.0%	0.3	Pass Low
25	5	Chapel Hill / Station Road / B1051	Station Road	B1051 (W)	5:13:30	11	10	-1	-4.9%	0.2	Pass Low
26	5	Chapel Hill / Station Road / B1051	Station Road	B1051 (N)	5:13:9	13	13	0	-2.7%	0.1	Pass Low
27	5	Chapel Hill / Station Road / B1051	Station Road	Castle	5:13:15	3	3	0	4.9%	0.1	Pass Low
28	5	Chapel Hill / Station Road / B1051	Station Road	Church Road	5:13:29	35	32	-3	-7.3%	0.4	Pass Low
29	5	Chapel Hill / Station Road / B1051	B1051 (W)	B1051 (N)	5:5:9	209	228	19	9.1%	1.3	Pass Low
30	5	Chapel Hill / Station Road / B1051	B1051 (W)	Castle	5:5:15	27	29	2	7.2%	0.4	Pass Low
31	5	Chapel Hill / Station Road / B1051	B1051 (W)	Church Road	5:5:29	79	83	3	4.4%	0.4	Pass Low
32	5	Chapel Hill / Station Road / B1051	B1051 (W)	Station Road	5:5:14	13	13	0	2.7%	0.1	Pass Low
33	4	Lower Street / B1051	Lower Street	B1051 (N)	4:11:18	11	11	0	-1.8%	0.1	Pass Low
34	4	Lower Street / B1051	Lower Street	B1051 (S)	4:11:39	114	113	-1	-0.7%	0.1	Pass Low
35	4	Lower Street / B1051	B1051 (N)	B1051 (S)	4:40:39	161	154	-7	-4.5%	0.6	Pass Low
36	4	Lower Street / B1051	B1051 (N)	Lower Street	4:40:10	15	14	-1	-6.3%	0.2	Pass Low
37	4	Lower Street / B1051	B1051 (S)	Lower Street	4:10:10	164	182	18	10.8%	1.3	Pass Low
38	4	Lower Street / B1051	B1051 (S)	B1051 (N)	4:9:18	268	293	25	9.3%	1.5	Pass Low

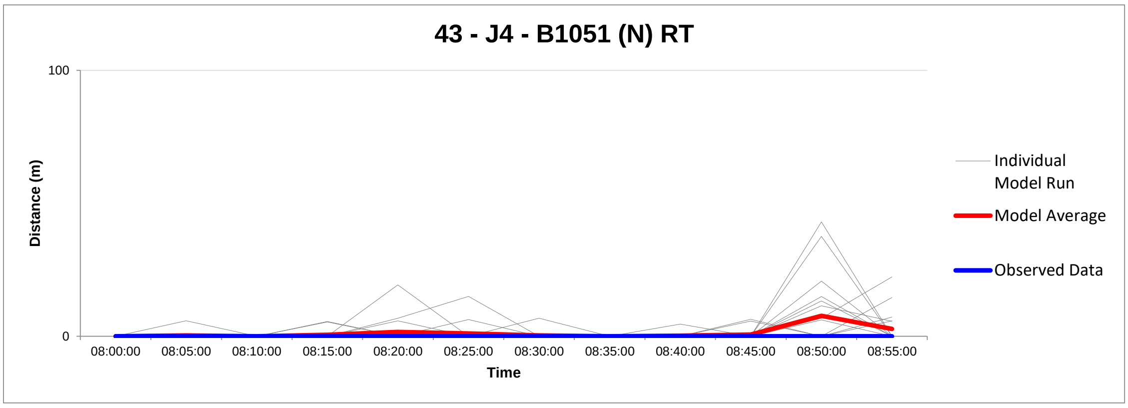
	Sum Obs.	Sum Mod.	Diff	% Diff	Ave. GEH
Overall Stats	3553	3550	-3	-0.1%	0.4

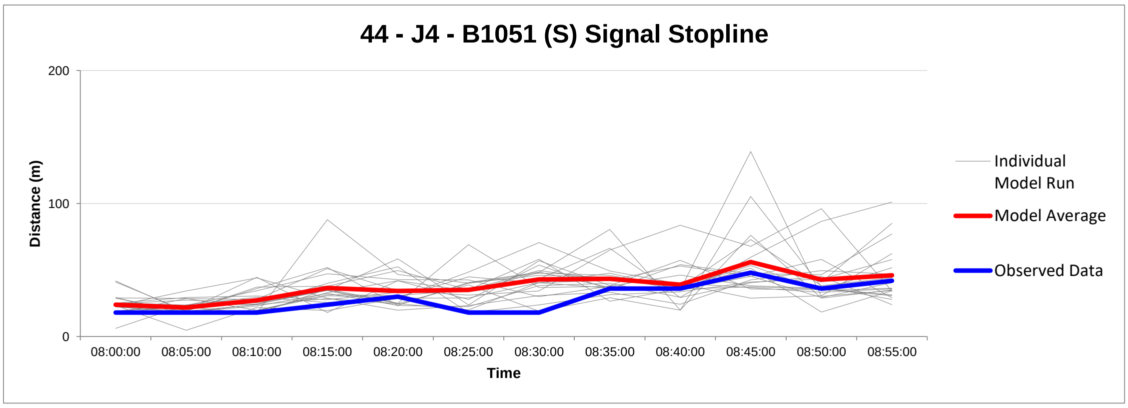
Queue Graphs

Junction Number 1
AM Peak



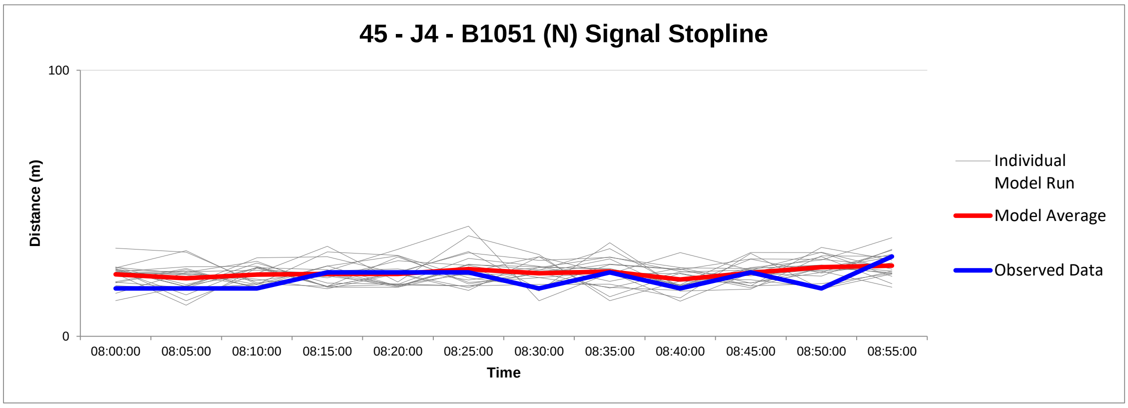


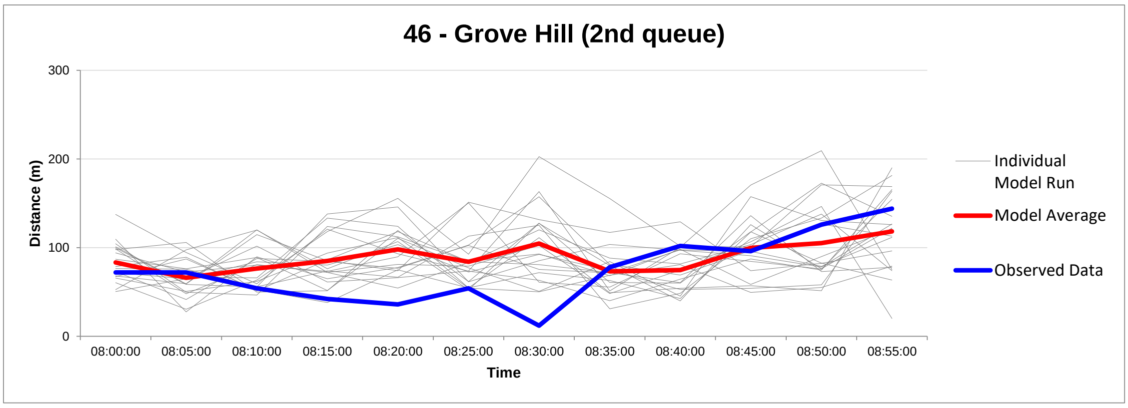


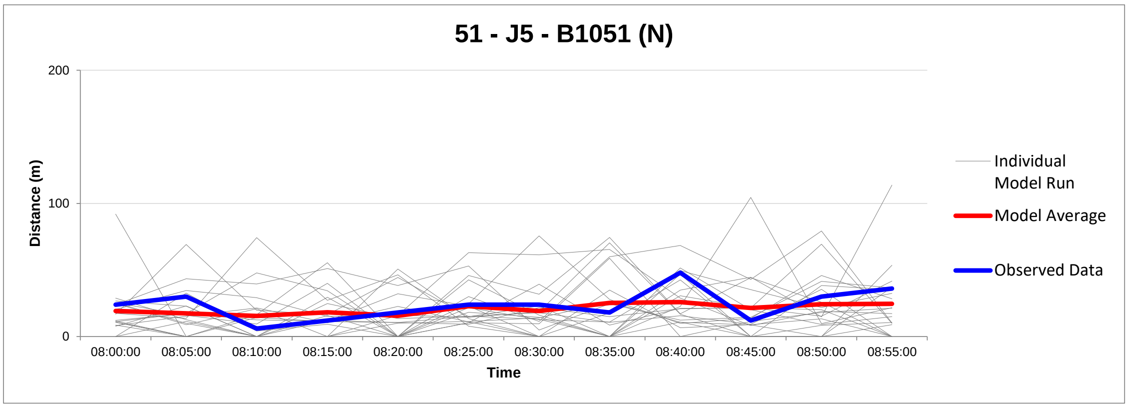


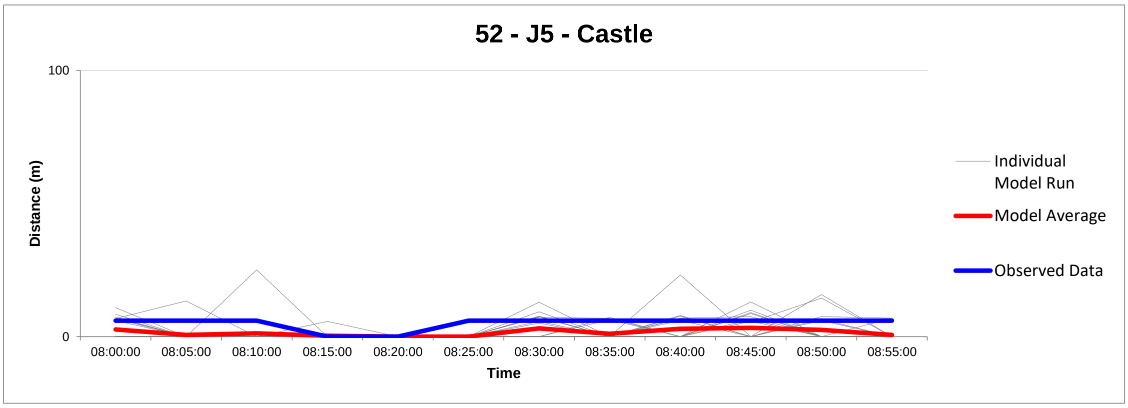
Queue Graphs

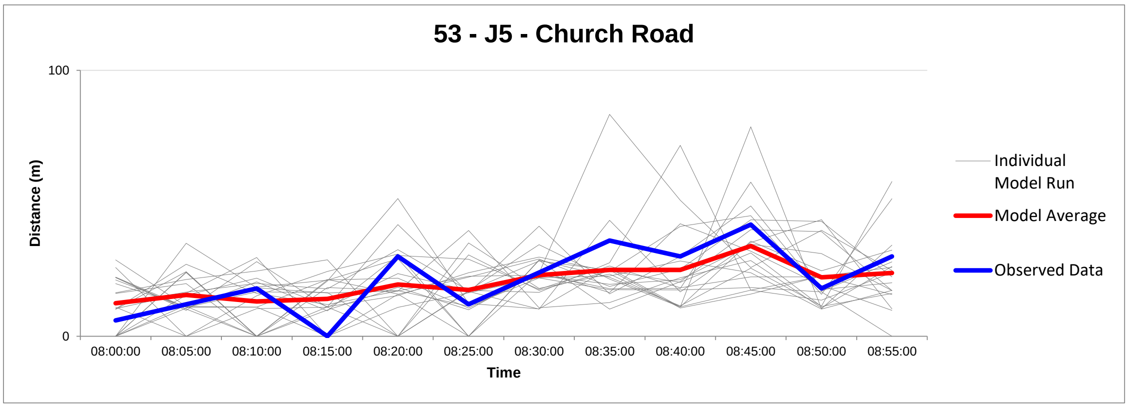
Junction Number 1
AM Peak

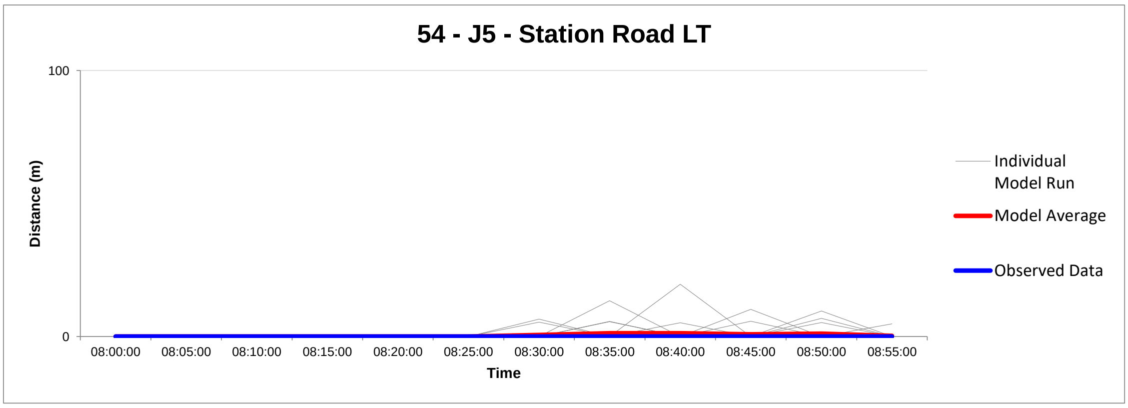





51 - J5 - B1051 (N)
200
100
0
Distance (m)
08:00:00
08:05:00
08:10:00
08:15:00
08:20:00
08:25:00
08:30:00
08:35:00
08:40:00
08:45:00
08:50:00
08:55:00
Time
Individual Model Run
Model Average
Observed Data

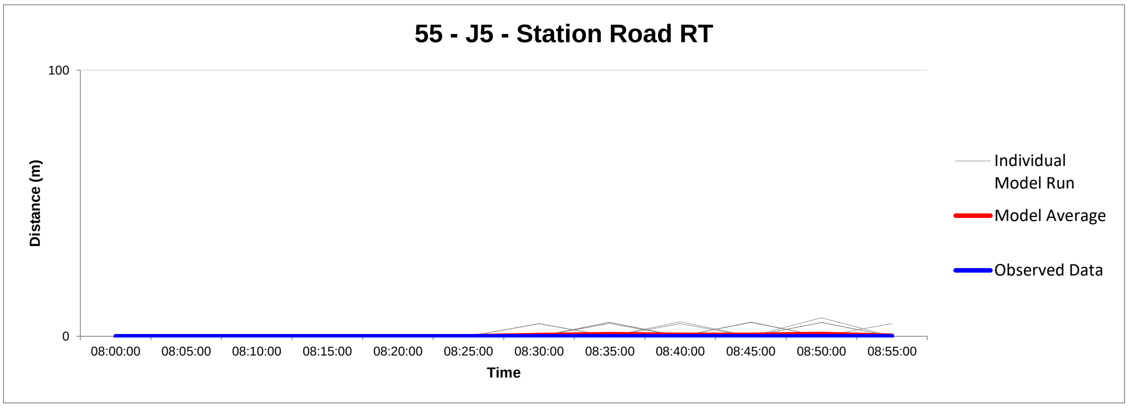

52 - J5 - Castle
100
0
Distance (m)
08:00:00
08:05:00
08:10:00
08:15:00
08:20:00
08:25:00
08:30:00
08:35:00
08:40:00
08:45:00
08:50:00
08:55:00
Time
Individual Model Run
Model Average
Observed Data

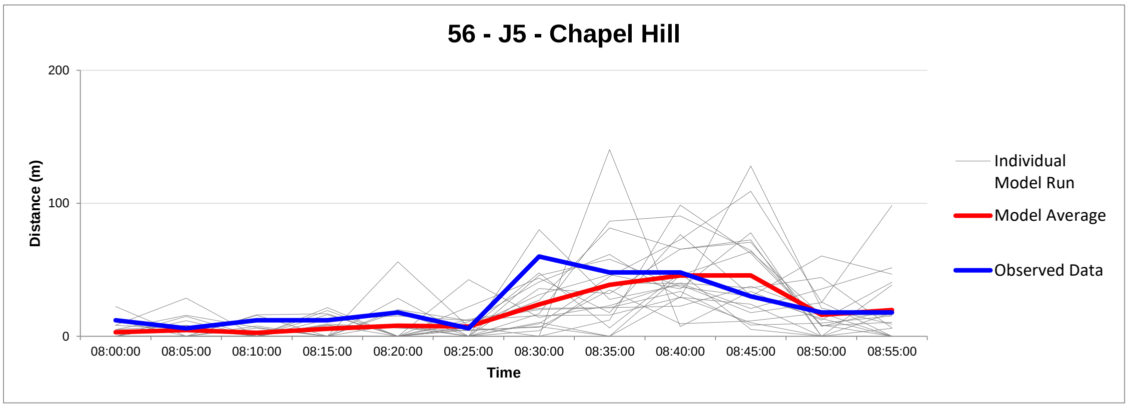

53 - J5 - Church Road
100
0
Distance (m)
08:00:00
08:05:00
08:10:00
08:15:00
08:20:00
08:25:00
08:30:00
08:35:00
08:40:00
08:45:00
08:50:00
08:55:00
Time
Individual Model Run
Model Average
Observed Data


54 - J5 - Station Road LT
100
0
Distance (m)
08:00:00
08:05:00
08:10:00
08:15:00
08:20:00
08:25:00
08:30:00
08:35:00
08:40:00
08:45:00
08:50:00
08:55:00
Time
Individual Model Run
Model Average
Observed Data

Queue Graphs

Junction Number 2
AM Peak

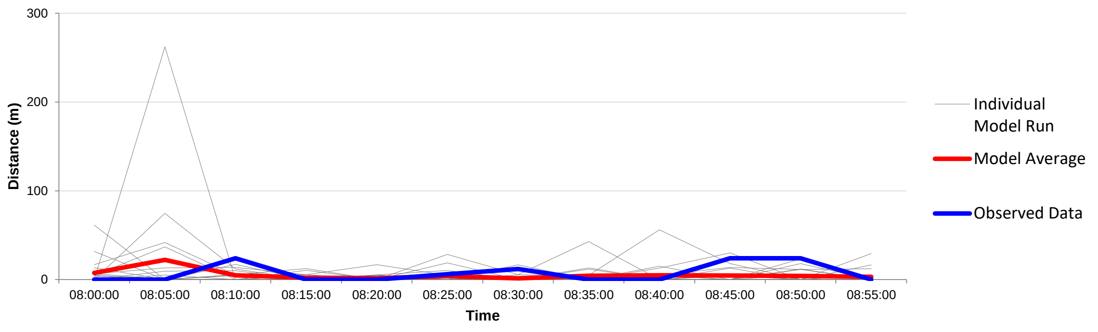




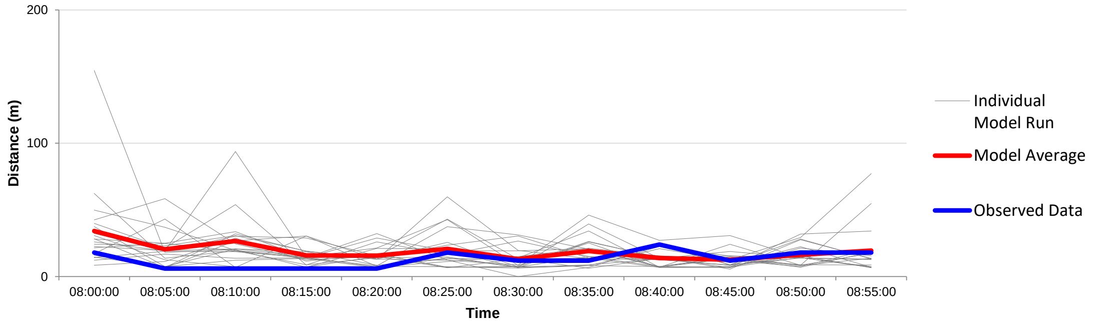
Queue Graphs

Junction Number 3
AM Peak

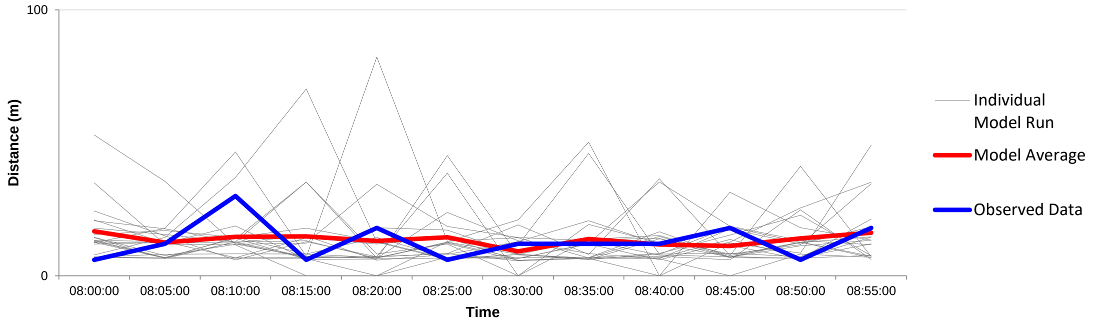
101 - J10 - Cambridge Road (N) RT



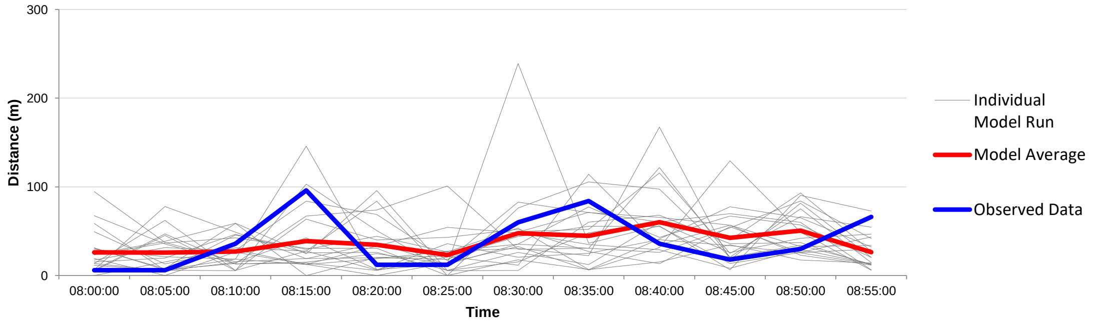
102 - J10 - Chapel Hill LT

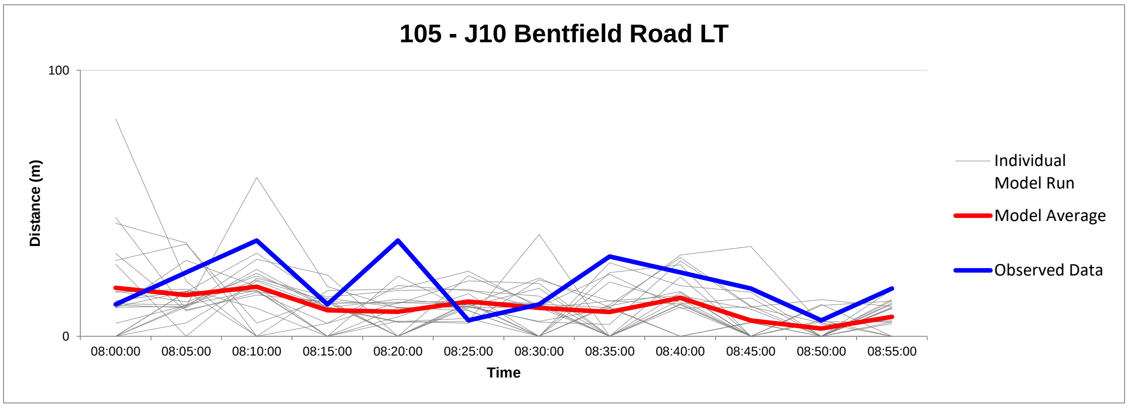


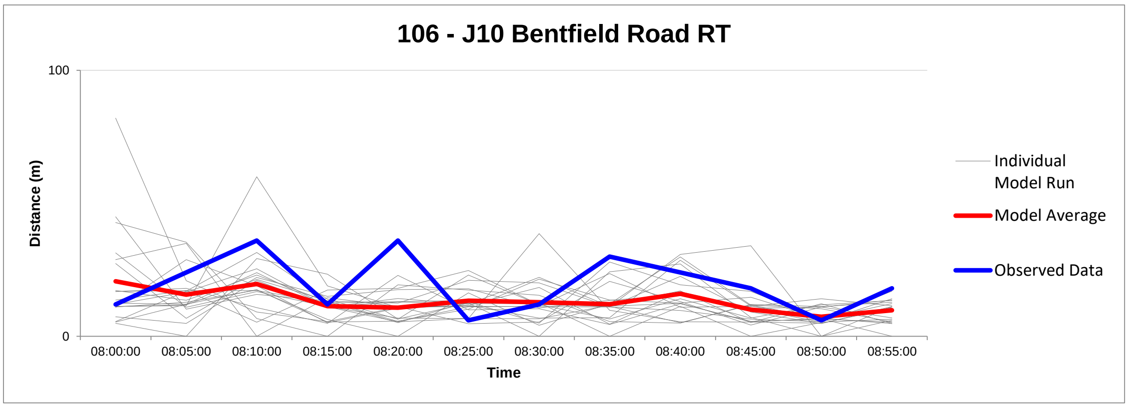
103 - J10 - Chapel Hill RT



104 - J10 - Silver Street RT

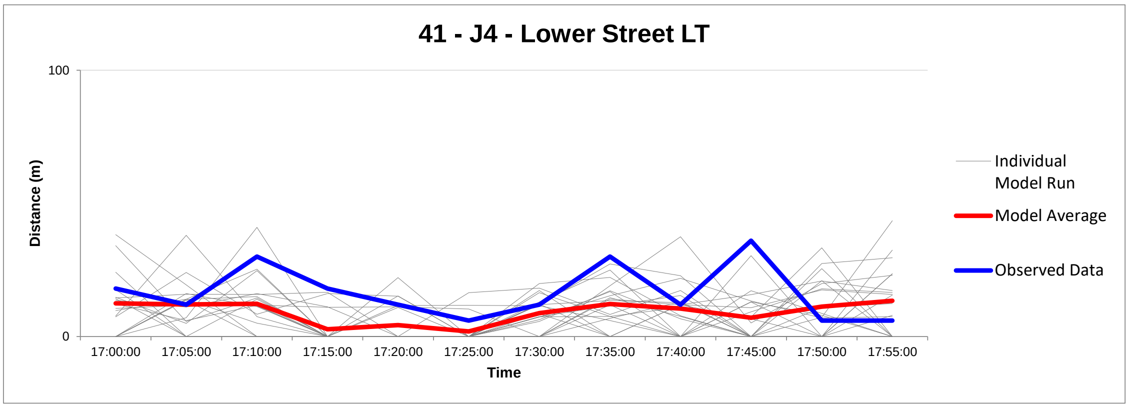


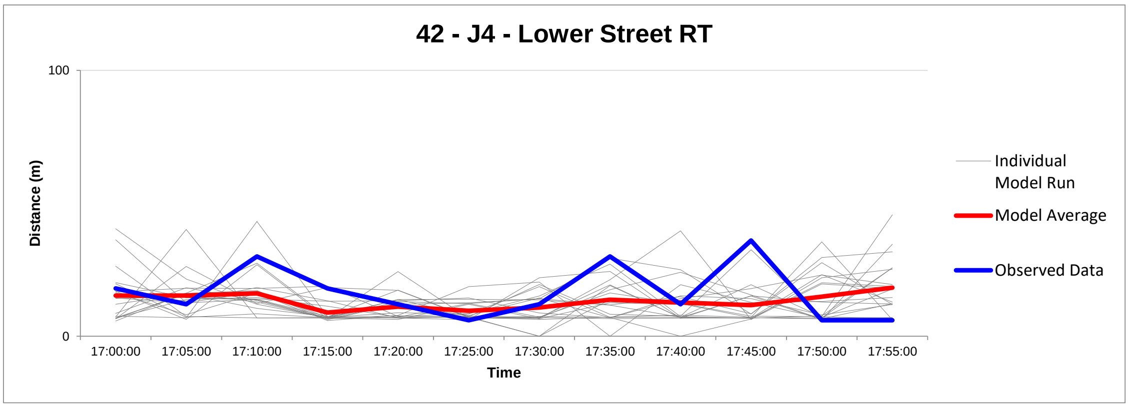

105 - J10 Bentfield Road LT
100
0
Distance (m)
08:00:00
08:05:00
08:10:00
08:15:00
08:20:00
08:25:00
08:30:00
08:35:00
08:40:00
08:45:00
08:50:00
08:55:00
Time
Individual Model Run
Model Average
Observed Data

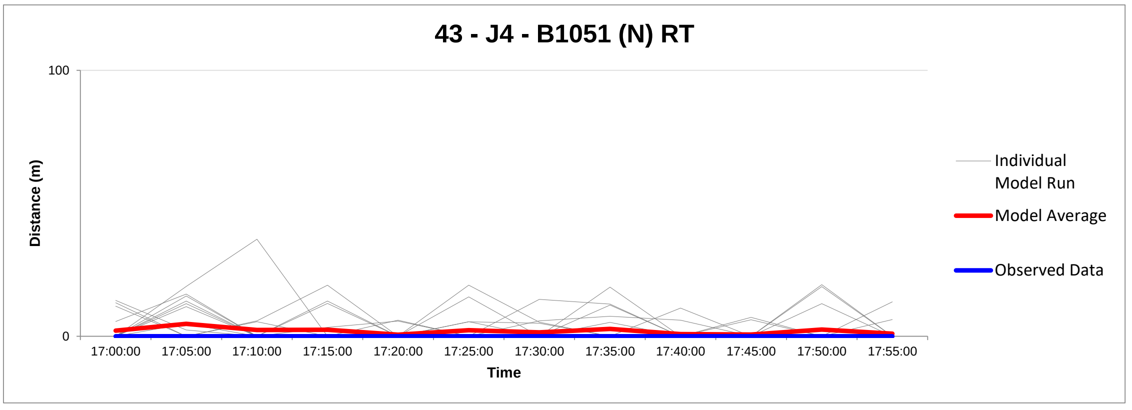

106 - J10 Bentfield Road RT
100
0
Distance (m)
08:00:00
08:05:00
08:10:00
08:15:00
08:20:00
08:25:00
08:30:00
08:35:00
08:40:00
08:45:00
08:50:00
08:55:00
Time
Individual Model Run
Model Average
Observed Data

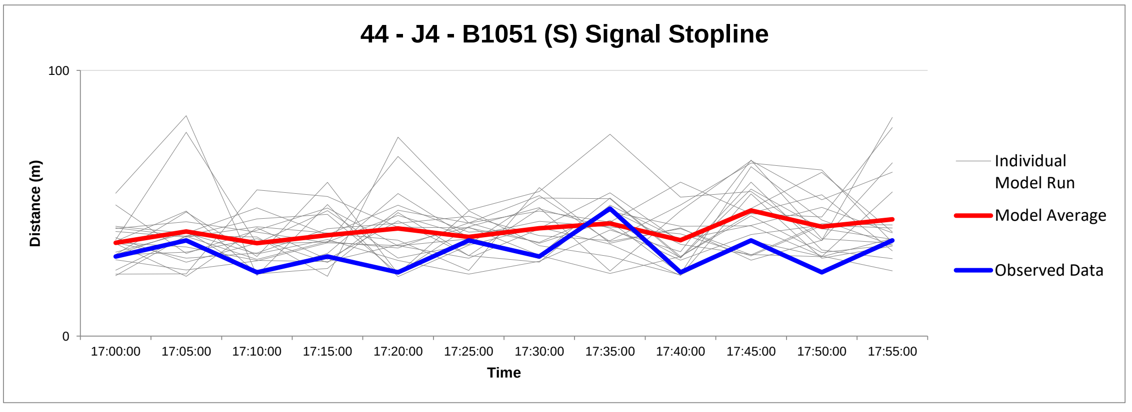
Queue Graphs

Junction Number 1
PM Peak



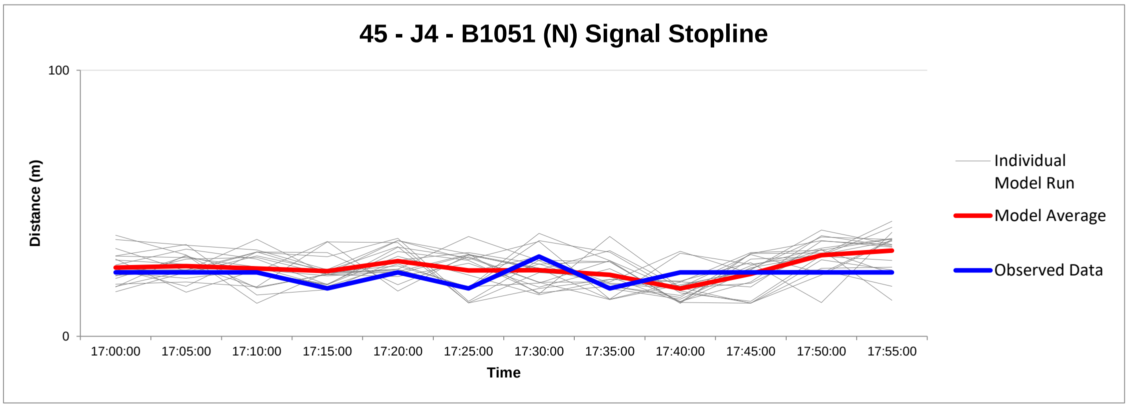


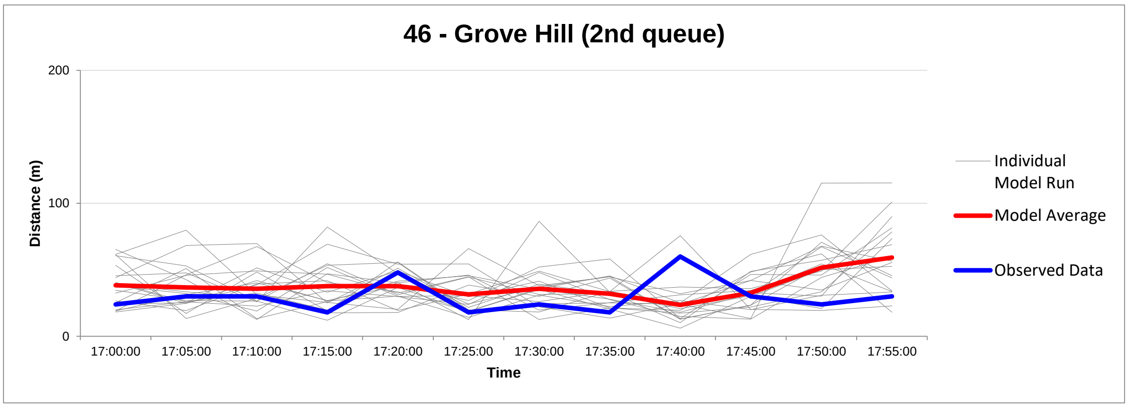




Queue Graphs

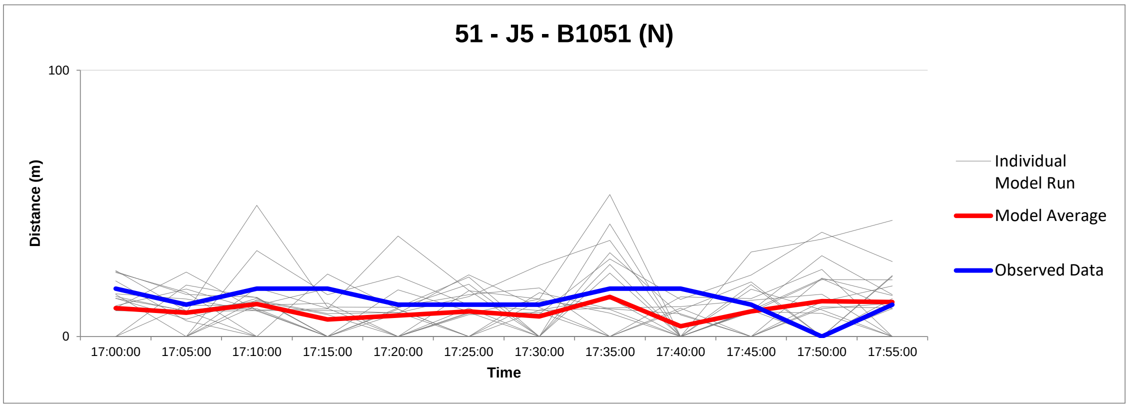
Junction Number 1
PM Peak

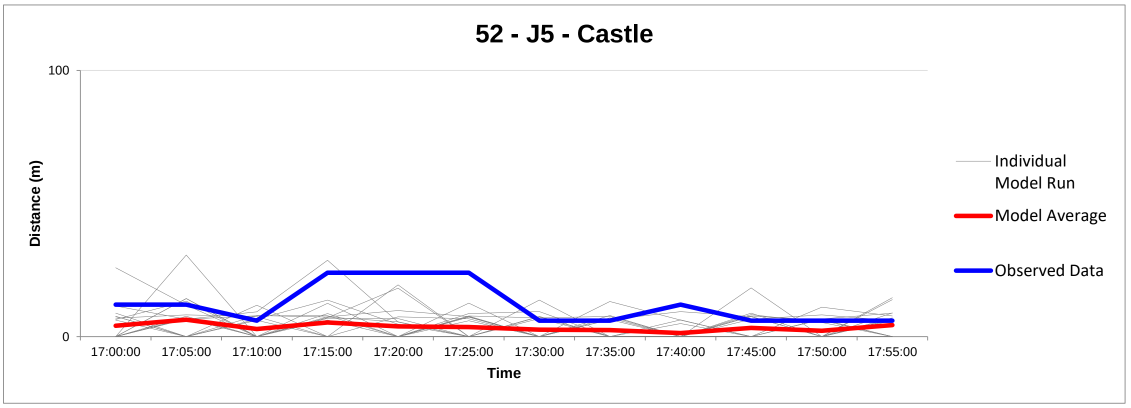


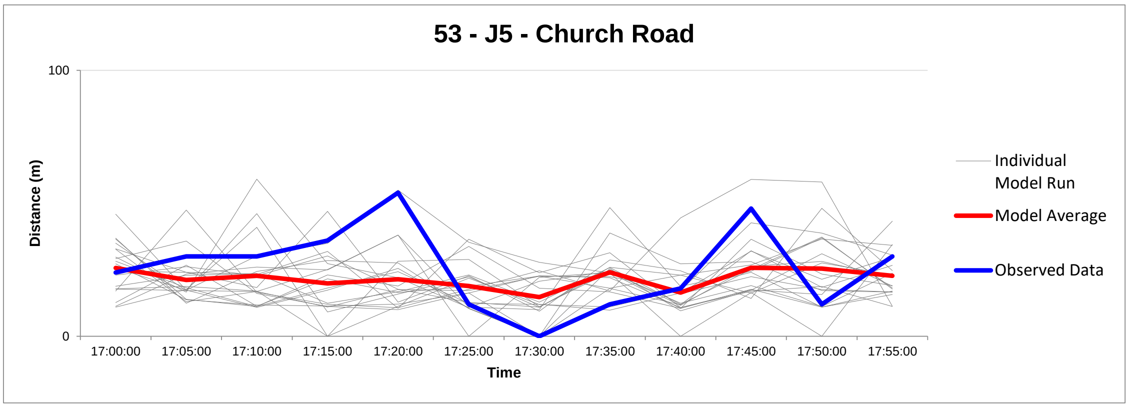


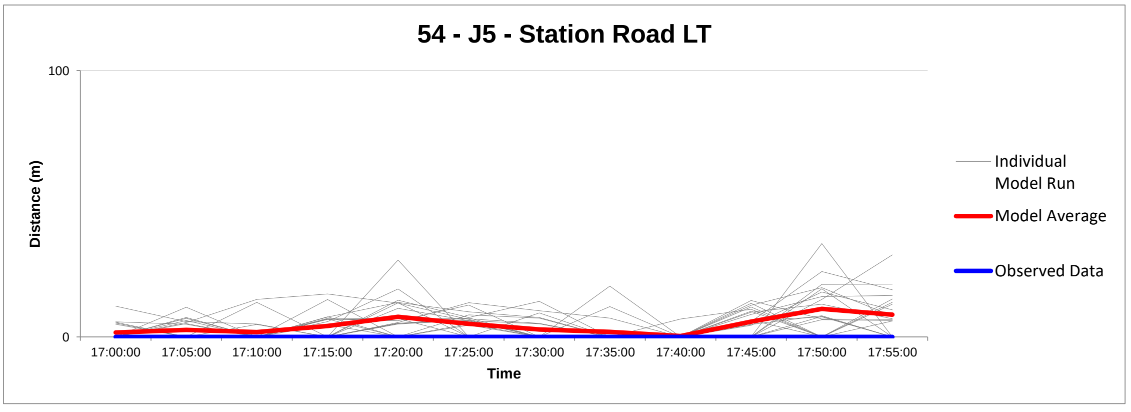
Queue Graphs

Junction Number 2
PM Peak



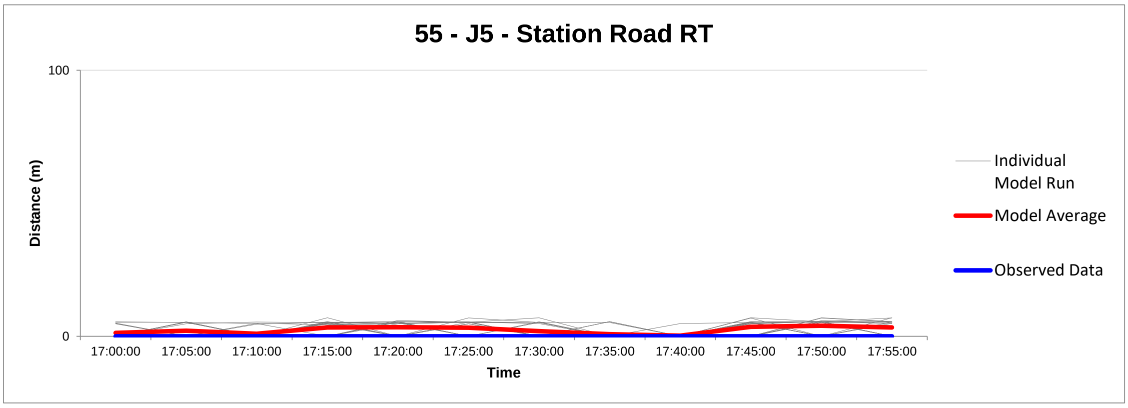


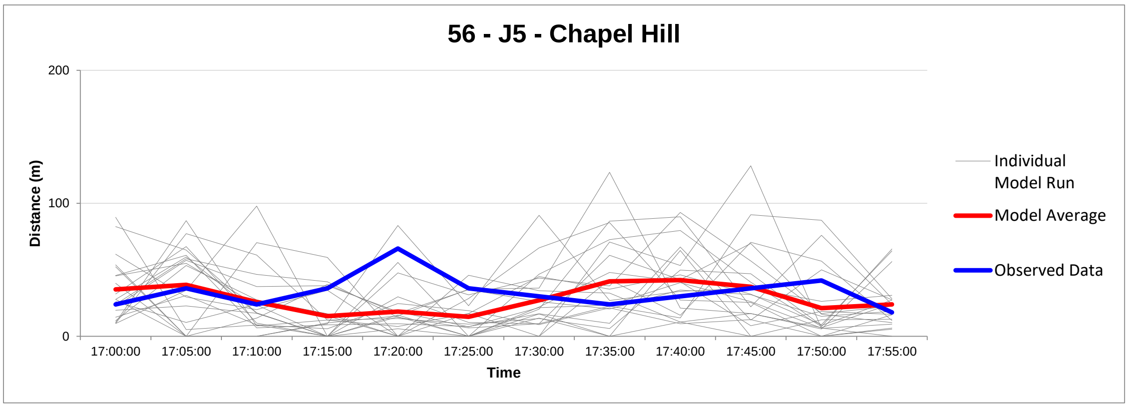


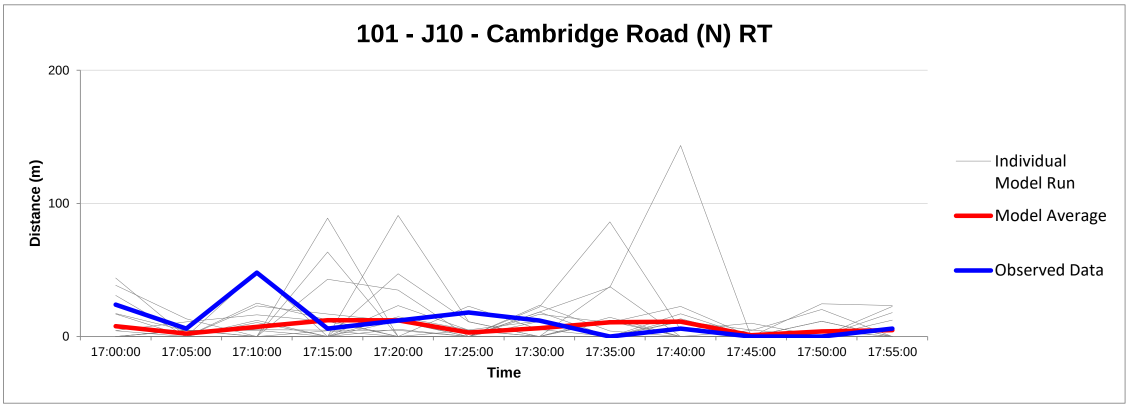


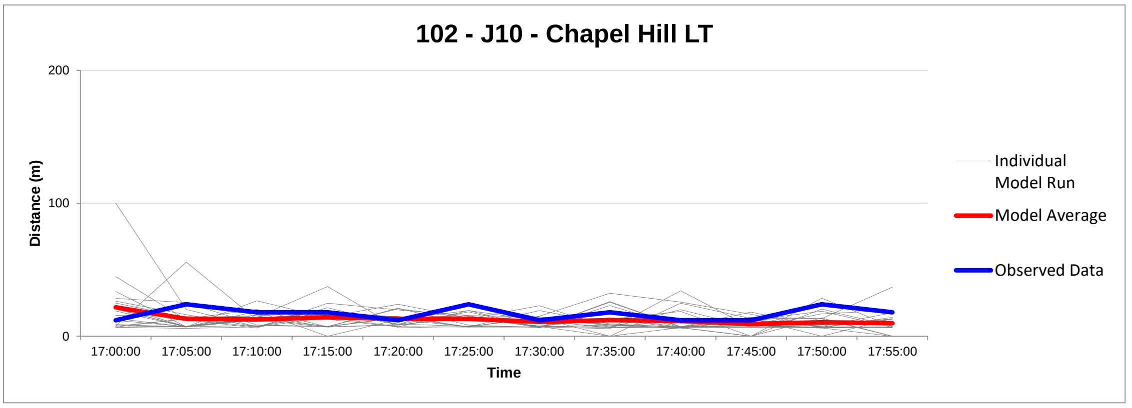
Queue Graphs

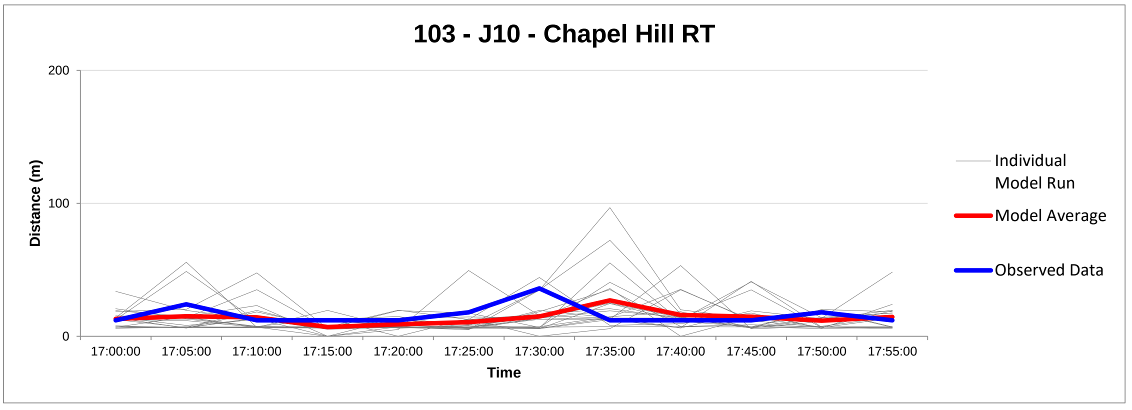
Junction Number 2
PM Peak

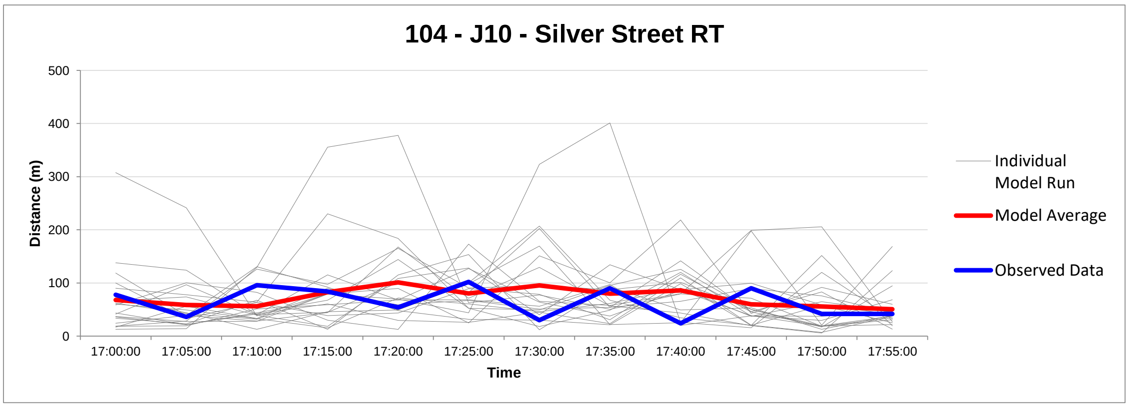





101 - J10 - Cambridge Road (N) RT
200
100
0
Distance (m)
17:00:00
17:05:00
17:10:00
17:15:00
17:20:00
17:25:00
17:30:00
17:35:00
17:40:00
17:45:00
17:50:00
17:55:00
Time
Individual Model Run
Model Average
Observed Data

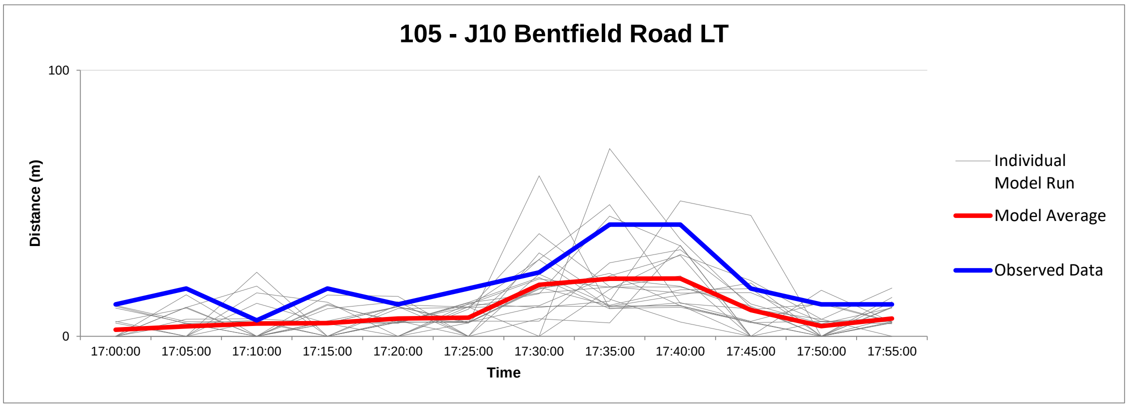

102 - J10 - Chapel Hill LT
200
100
0
Distance (m)
17:00:00
17:05:00
17:10:00
17:15:00
17:20:00
17:25:00
17:30:00
17:35:00
17:40:00
17:45:00
17:50:00
17:55:00
Time
Individual Model Run
Model Average
Observed Data

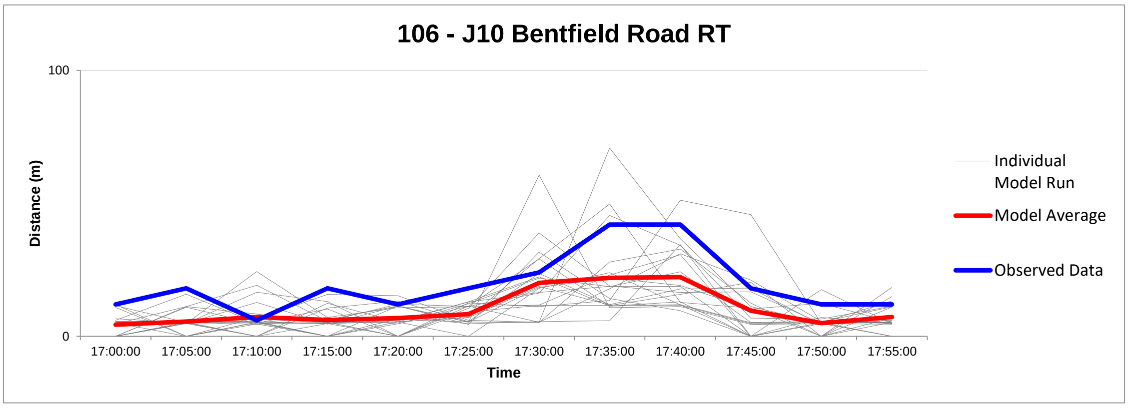

103 - J10 - Chapel Hill RT
200
100
0
Distance (m)
17:00:00
17:05:00
17:10:00
17:15:00
17:20:00
17:25:00
17:30:00
17:35:00
17:40:00
17:45:00
17:50:00
17:55:00
Time
Individual Model Run
Model Average
Observed Data


104 - J10 - Silver Street RT
500
400
300
200
100
0
Distance (m)
17:00:00
17:05:00
17:10:00
17:15:00
17:20:00
17:25:00
17:30:00
17:35:00
17:40:00
17:45:00
17:50:00
17:55:00
Time
Individual Model Run
Model Average
Observed Data

Queue Graphs

Junction Number 3
PM Peak





Journey Times
Validation Statistics

AM Peak

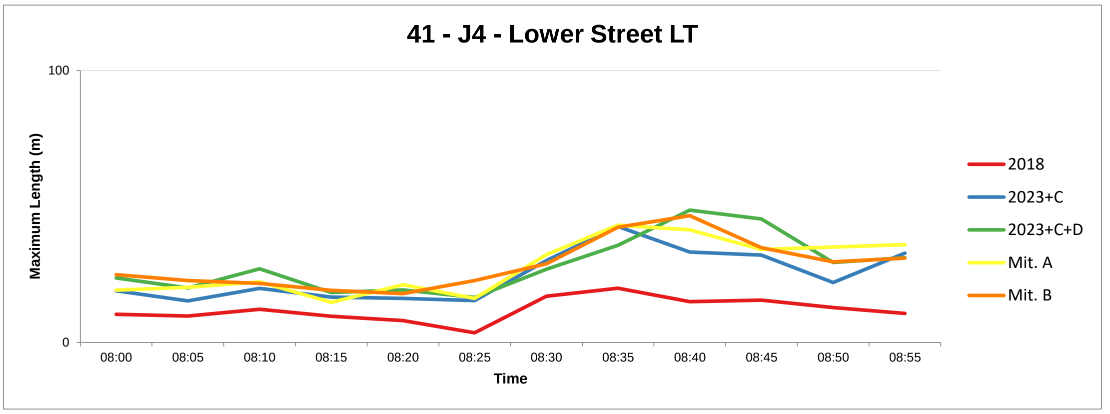
Route:	Segment	Graph Group	Observed Average	Observed 95% Conf	Modelled Average	Modelled 95% Conf	Var Chk	% Diff	Diff	Conf?	15%	60s	WebTAG	Distance (m)
101 - B1051 (SB): Farm to Lowe	Full	1	110		108	6	FALSE	-1.7%	-2	FALSE	TRUE	TRUE	TRUE	403
102 - B1051 (SB): Lower Rd turi	Full	1	18		19	0	TRUE	5.2%	1	FALSE	TRUE	TRUE	TRUE	110
103 - B1051 (WB): Chapel Hill F	Full	1	68		73	2	TRUE	6.9%	5	FALSE	TRUE	TRUE	TRUE	476
104 - Silver Street (SB): Crafton	Full	1	29		30	0	TRUE	1.8%	1	FALSE	TRUE	TRUE	TRUE	315
105 - Silver Street (NB): Blythwo	Full	2	47		41	1	TRUE	-13.7%	-6	FALSE	TRUE	TRUE	TRUE	346
106 - B1051 (EB): Crafton Gree	Full	2	69		73	2	TRUE	5.4%	4	FALSE	TRUE	TRUE	TRUE	451
107 - B1051 (NB): Chapel Hill R	Full	2	43		32	1	TRUE	-24.5%	-11	FALSE	FALSE	TRUE	TRUE	111
108 - B1051 (NB): Lower Rd turi	Full	2	40		40	0	TRUE	-0.7%	0	FALSE	TRUE	TRUE	TRUE	404

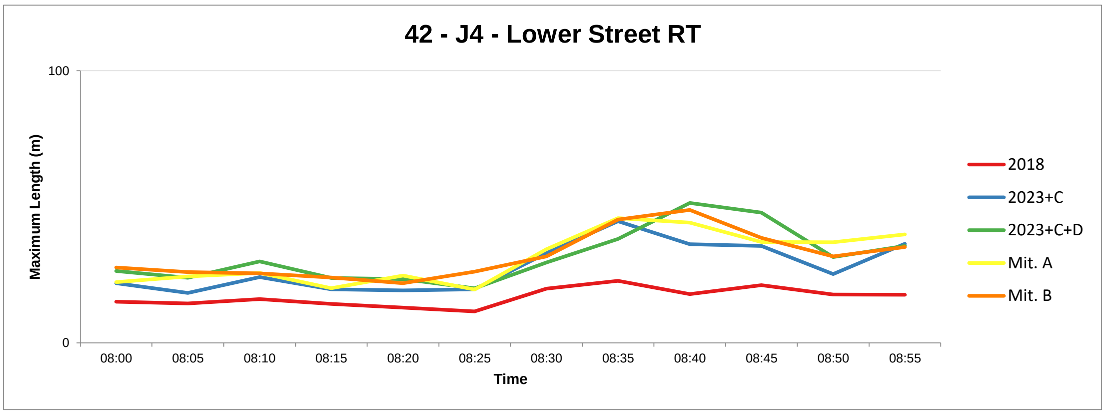
Journey Times
Validation Statistics

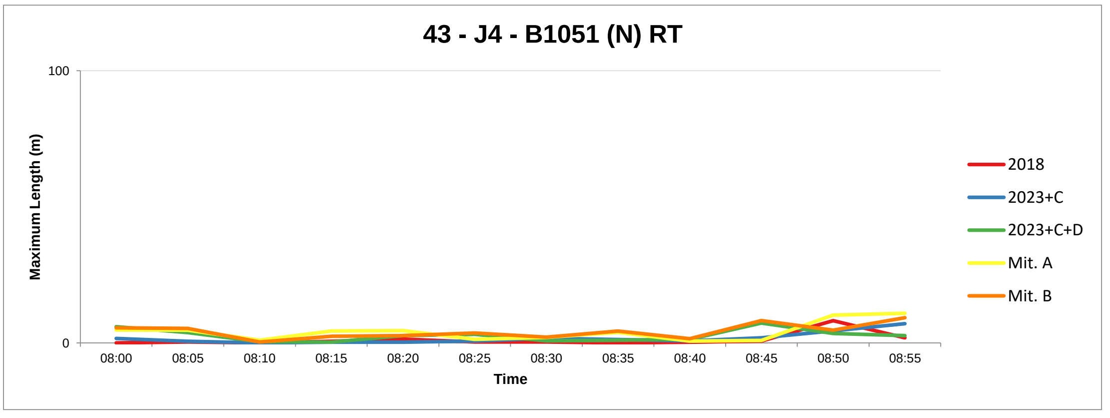
PM Peak

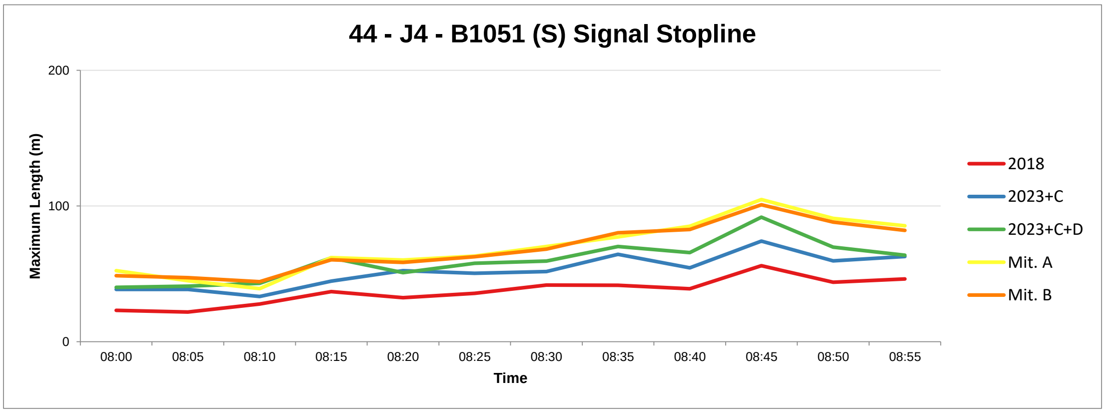
Route:	Segment	Graph Group	Observed Average	Observed 95% Conf	Modelled Average	Modelled 95% Conf	Modelled Var Chk	% Diff	Diff	Conf?	15%	60s	WebTAG	Distance (m)
101 - B1051 (SB): Farm to Lowe	Full	1	82		97	3	TRUE	18.5%	15	FALSE	FALSE	TRUE	TRUE	403
102 - B1051 (SB): Lower Rd turi	Full	1	20		17	0	TRUE	-13.6%	-3	FALSE	TRUE	TRUE	TRUE	110
103 - B1051 (WB): Chapel Hill F	Full	1	88		77	2	TRUE	-12.4%	-11	FALSE	TRUE	TRUE	TRUE	476
104 - Silver Street (SB): Crafton	Full	1	25		30	0	TRUE	18.3%	5	FALSE	FALSE	TRUE	TRUE	315
105 - Silver Street (NB): Blythwc	Full	2	56		45	1	TRUE	-19.9%	-11	FALSE	FALSE	TRUE	TRUE	346
106 - B1051 (EB): Crafton Gree	Full	2	85		68	1	TRUE	-20.1%	-17	FALSE	FALSE	TRUE	TRUE	451
107 - B1051 (NB): Chapel Hill R	Full	2	30		25	0	TRUE	-15.1%	-5	FALSE	FALSE	TRUE	TRUE	111
108 - B1051 (NB): Lower Rd turi	Full	2	37		41	0	TRUE	11.5%	4	FALSE	TRUE	TRUE	TRUE	404

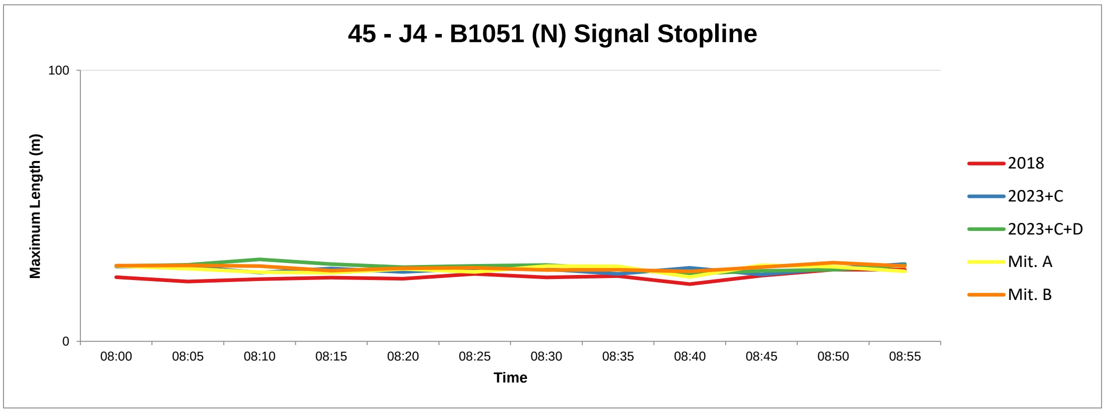
APPENDIX C – 2023 MODEL FORECAST RESULTS

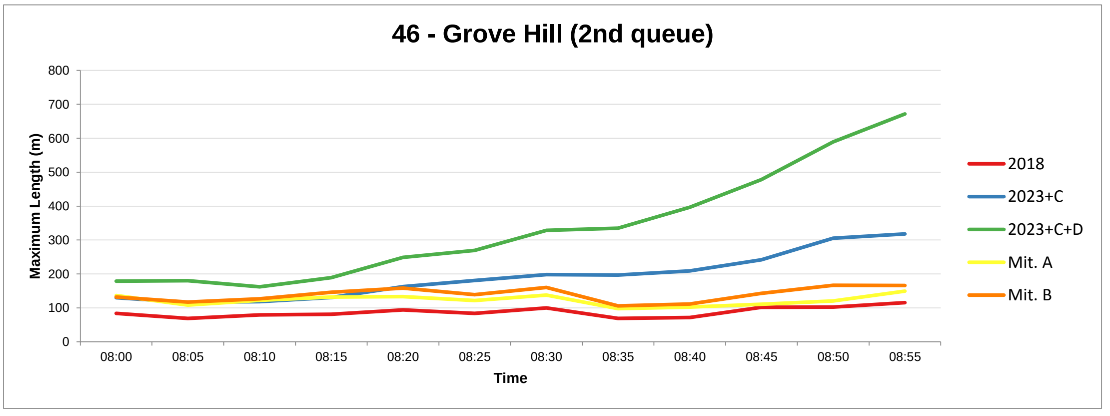

41 - J4 - Lower Street LT
100
0
Maximum Length (m)
08:00
08:05
08:10
08:15
08:20
08:25
08:30
08:35
08:40
08:45
08:50
08:55
Time
2018
2023+C
2023+C+D
Mit. A
Mit. B

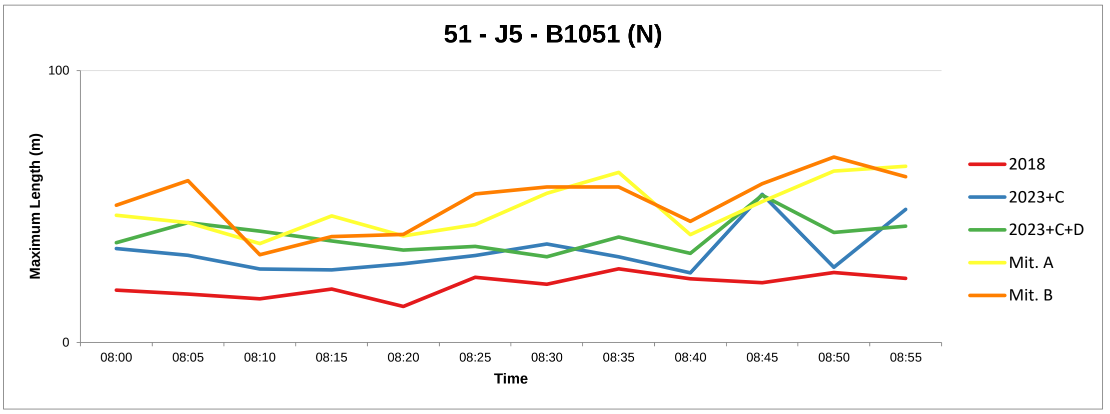

42 - J4 - Lower Street RT
100
0
Maximum Length (m)
08:00
08:05
08:10
08:15
08:20
08:25
08:30
08:35
08:40
08:45
08:50
08:55
Time
2018
2023+C
2023+C+D
Mit. A
Mit. B

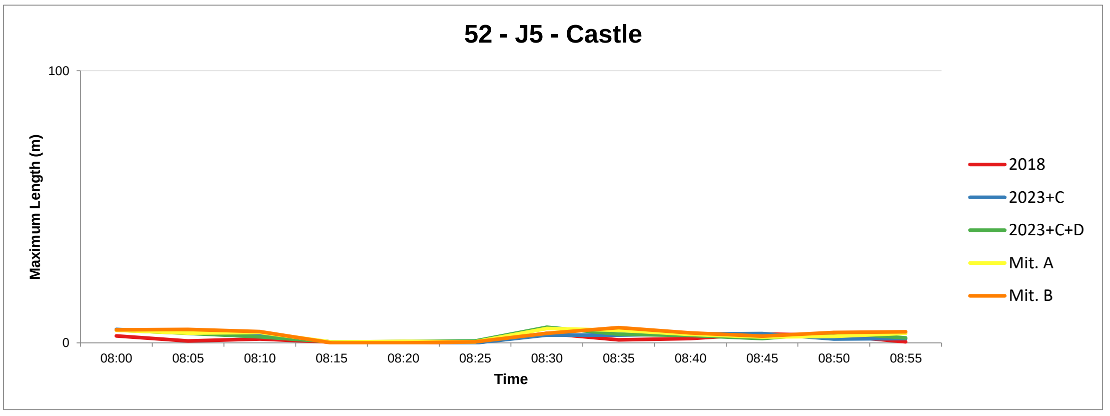

43 - J4 - B1051 (N) RT
100
0
Maximum Length (m)
08:00
08:05
08:10
08:15
08:20
08:25
08:30
08:35
08:40
08:45
08:50
08:55
Time
2018
2023+C
2023+C+D
Mit. A
Mit. B

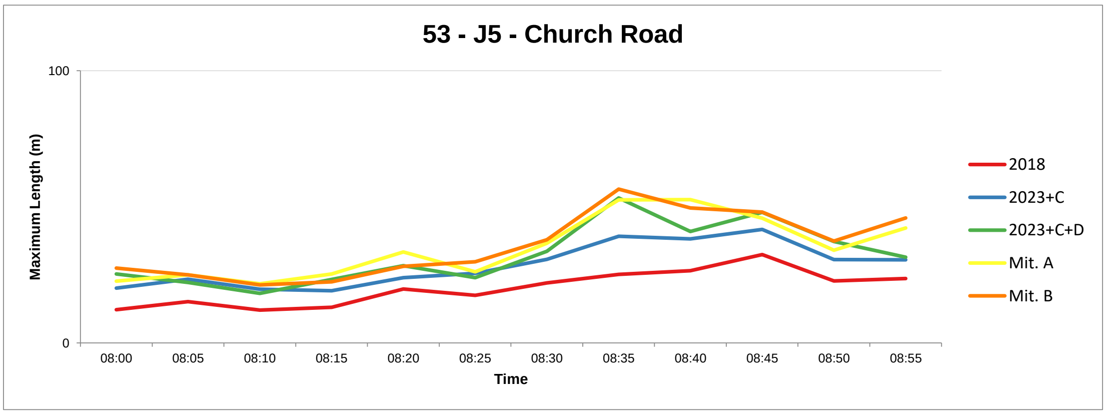

44 - J4 - B1051 (S) Signal Stopline
200
100
0
Maximum Length (m)
08:00
08:05
08:10
08:15
08:20
08:25
08:30
08:35
08:40
08:45
08:50
08:55
Time
2018
2023+C
2023+C+D
Mit. A
Mit. B

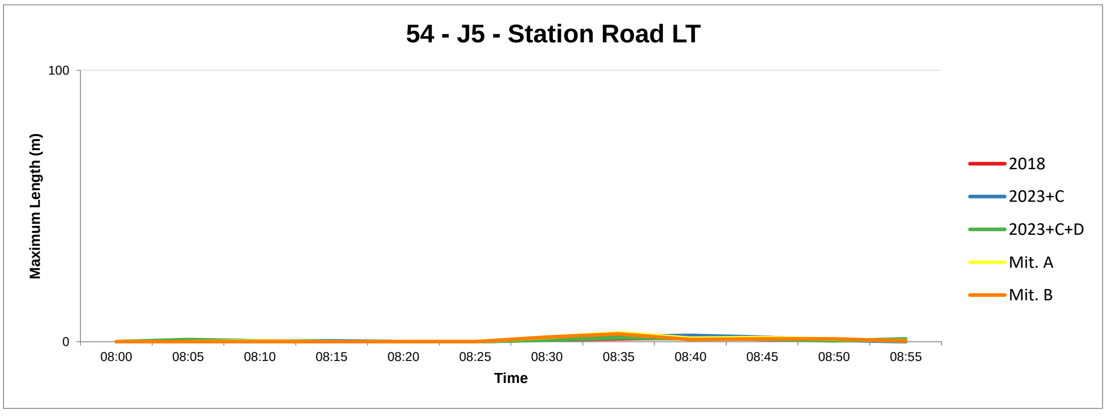

45 - J4 - B1051 (N) Signal Stopline
Maximum Length (m)
100
0
08:00
08:05
08:10
08:15
08:20
08:25
08:30
08:35
08:40
08:45
08:50
08:55
Time
2018
2023+C
2023+C+D
Mit. A
Mit. B

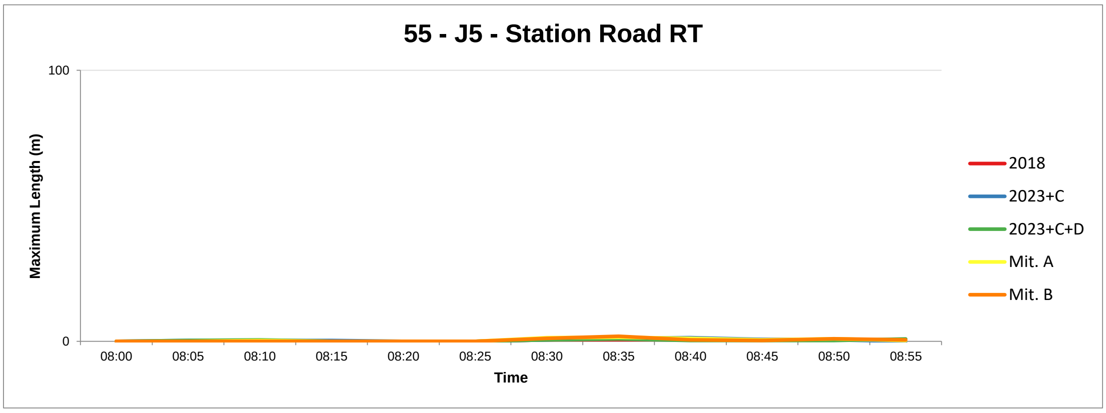

46 - Grove Hill (2nd queue)
Maximum Length (m)
800
700
600
500
400
300
200
100
0
08:00
08:05
08:10
08:15
08:20
08:25
08:30
08:35
08:40
08:45
08:50
08:55
Time
2018
2023+C
2023+C+D
Mit. A
Mit. B

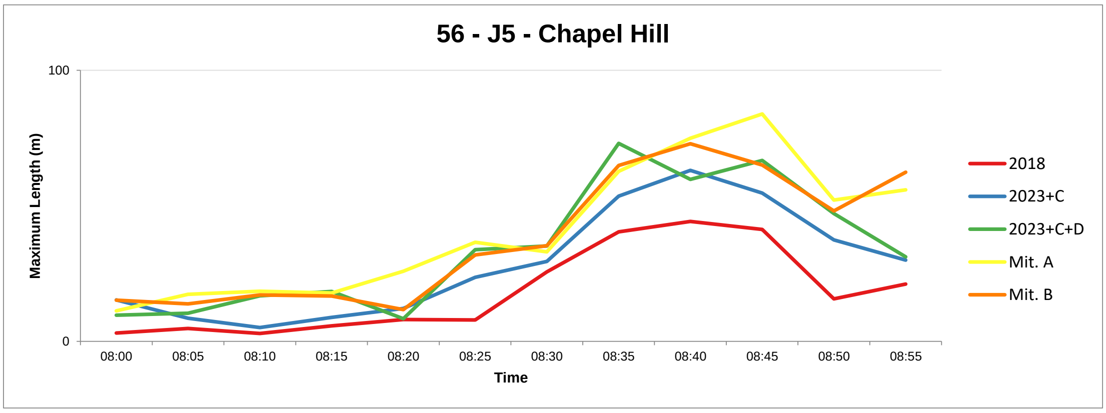

51 - J5 - B1051 (N)
Maximum Length (m)
100
0
08:00
08:05
08:10
08:15
08:20
08:25
08:30
08:35
08:40
08:45
08:50
08:55
Time
2018
2023+C
2023+C+D
Mit. A
Mit. B

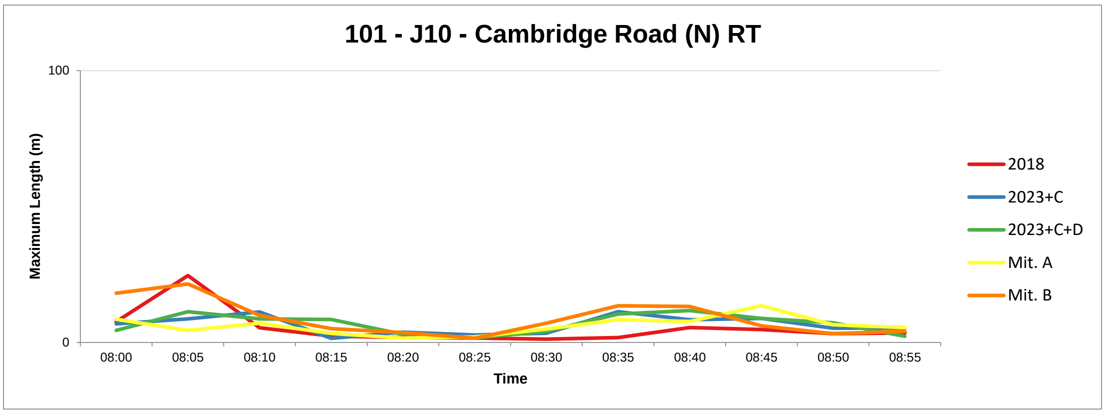

52 - J5 - Castle
Maximum Length (m)
100
0
08:00
08:05
08:10
08:15
08:20
08:25
08:30
08:35
08:40
08:45
08:50
08:55
Time
2018
2023+C
2023+C+D
Mit. A
Mit. B

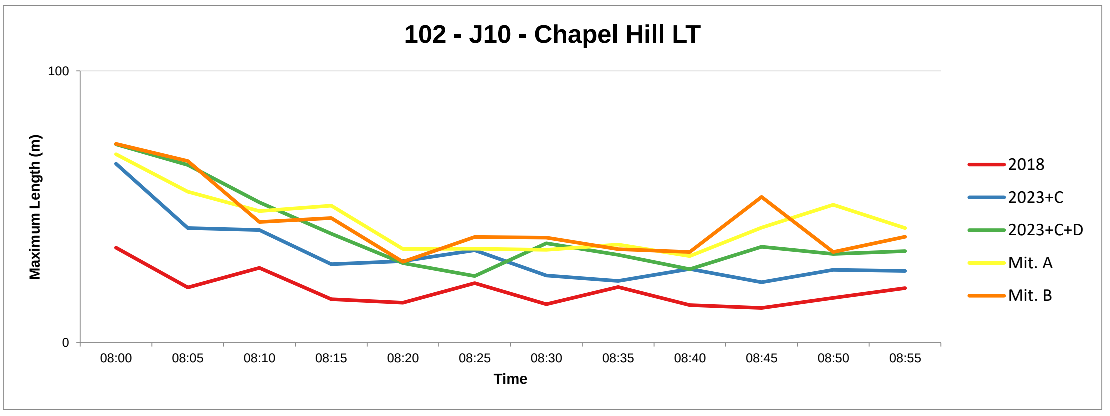

53 - J5 - Church Road
Maximum Length (m)
100
0
08:00
08:05
08:10
08:15
08:20
08:25
08:30
08:35
08:40
08:45
08:50
08:55
Time
2018
2023+C
2023+C+D
Mit. A
Mit. B

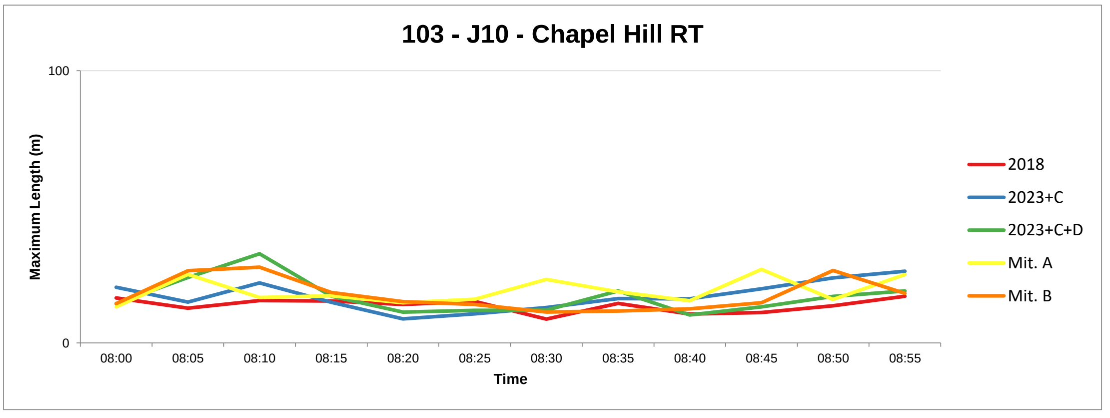

54 - J5 - Station Road LT
Maximum Length (m)
100
0
08:00
08:05
08:10
08:15
08:20
08:25
08:30
08:35
08:40
08:45
08:50
08:55
Time
2018
2023+C
2023+C+D
Mit. A
Mit. B

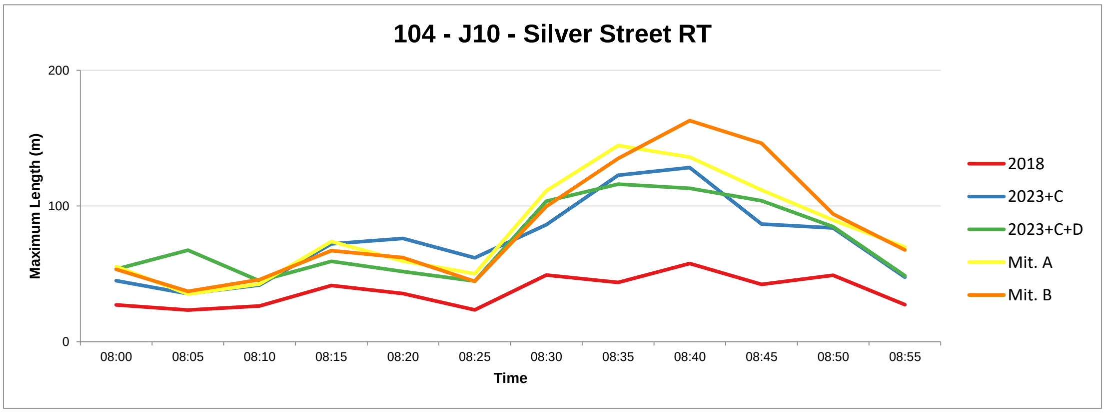

55 - J5 - Station Road RT
100
0
Maximum Length (m)
08:00
08:05
08:10
08:15
08:20
08:25
08:30
08:35
08:40
08:45
08:50
08:55
Time
2018
2023+C
2023+C+D
Mit. A
Mit. B


56 - J5 - Chapel Hill
100
0
Maximum Length (m)
08:00
08:05
08:10
08:15
08:20
08:25
08:30
08:35
08:40
08:45
08:50
08:55
Time
2018
2023+C
2023+C+D
Mit. A
Mit. B


101 - J10 - Cambridge Road (N) RT
Maximum Length (m)
100
0
08:00
08:05
08:10
08:15
08:20
08:25
08:30
08:35
08:40
08:45
08:50
08:55
Time
2018
2023+C
2023+C+D
Mit. A
Mit. B

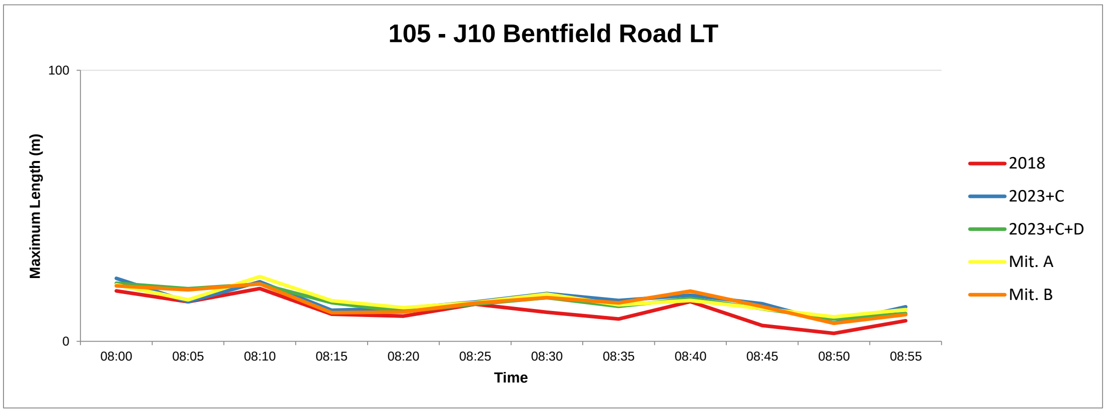

102 - J10 - Chapel Hill LT
Maximum Length (m)
100
0
08:00
08:05
08:10
08:15
08:20
08:25
08:30
08:35
08:40
08:45
08:50
08:55
Time
2018
2023+C
2023+C+D
Mit. A
Mit. B

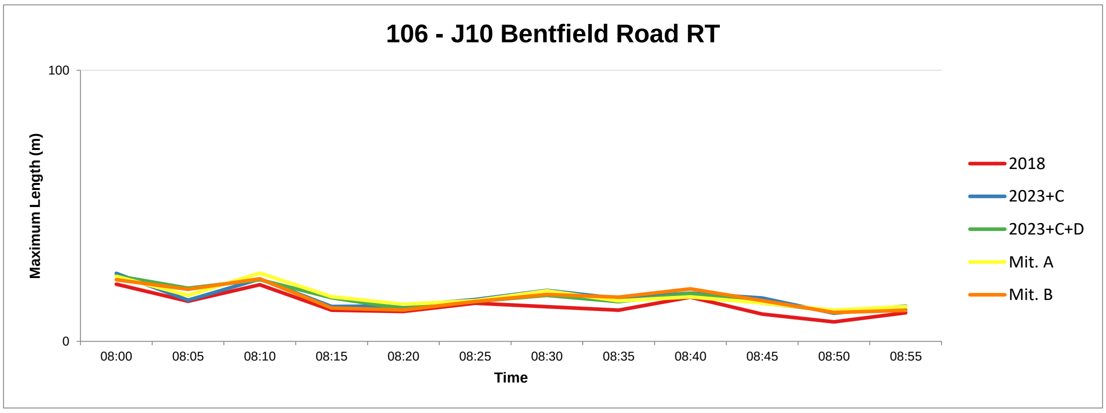

103 - J10 - Chapel Hill RT
Maximum Length (m)
100
0
08:00
08:05
08:10
08:15
08:20
08:25
08:30
08:35
08:40
08:45
08:50
08:55
Time
2018
2023+C
2023+C+D
Mit. A
Mit. B

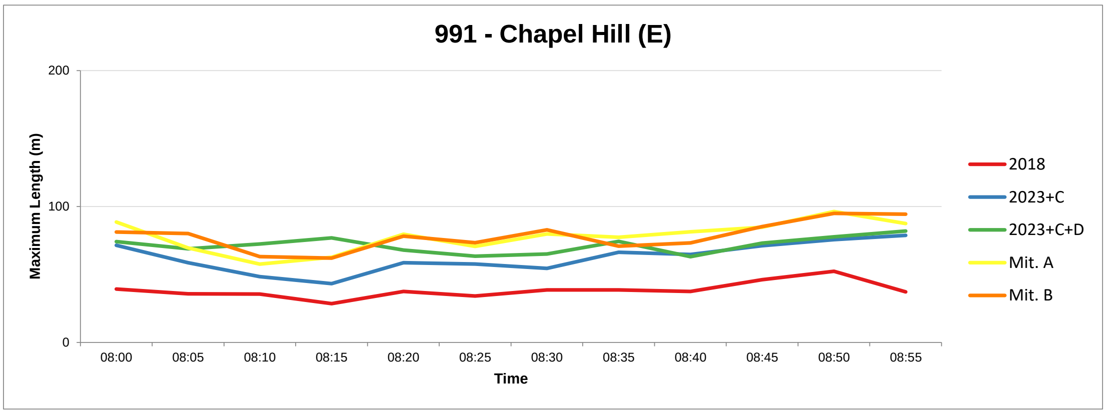

104 - J10 - Silver Street RT
Maximum Length (m)
200
100
0
08:00
08:05
08:10
08:15
08:20
08:25
08:30
08:35
08:40
08:45
08:50
08:55
Time
2018
2023+C
2023+C+D
Mit. A
Mit. B

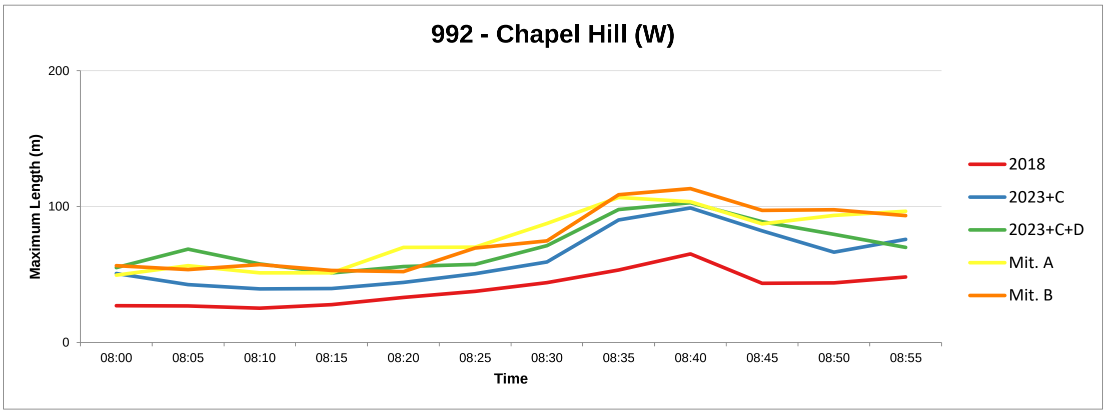
Comparison Graphs
AM

10






991 - Chapel Hill (E)
200
100
0
Maximum Length (m)
08:00
08:05
08:10
08:15
08:20
08:25
08:30
08:35
08:40
08:45
08:50
08:55
Time
2018
2023+C
2023+C+D
Mit. A
Mit. B


992 - Chapel Hill (W)
200
100
0
Maximum Length (m)
08:00
08:05
08:10
08:15
08:20
08:25
08:30
08:35
08:40
08:45
08:50
08:55
Time
2018
2023+C
2023+C+D
Mit. A
Mit. B

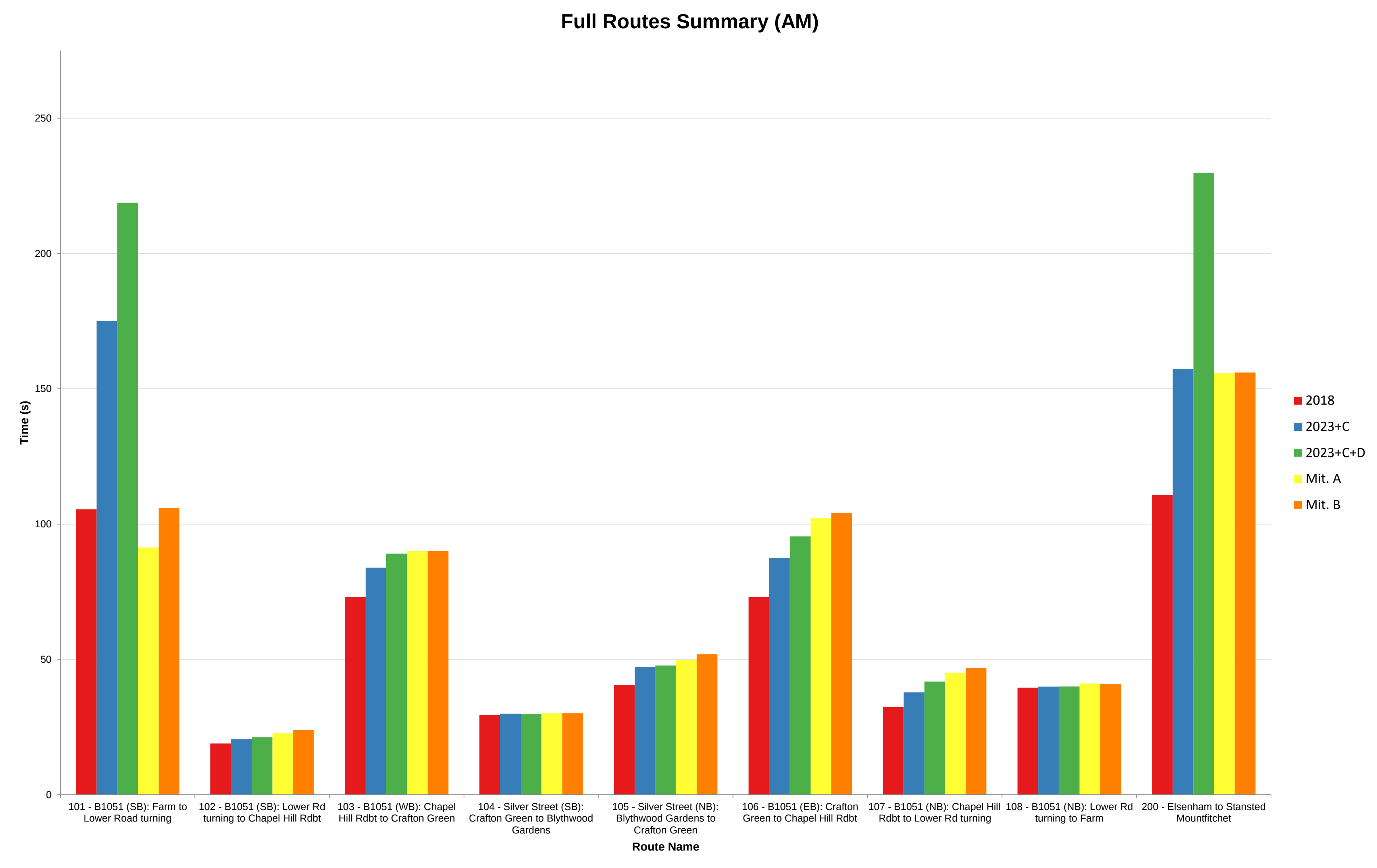
Queue Comparison
AM
Maximum Length Summary
Maximum Length (m)

	2018	2023+C	2023+C+D	Mit. A	Mit. B
41 - J4 - Lower Street LT	20.0	42.7	48.7	43.2	46.6
42 - J4 - Lower Street RT	22.8	44.7	51.4	45.8	48.8
43 - J4 - B1051 (N) RT	8.2	7.1	7.3	10.9	9.3
44 - J4 - B1051 (S) Signal Stoplin	56.0	74.1	91.8	104.8	100.9
45 - J4 - B1051 (N) Signal Stoplin	26.5	28.5	30.2	28.1	29.0
46 - Grove Hill (2nd queue)	115.3	317.9	671.5	149.2	166.5
51 - J5 - B1051 (N)	27.1	54.5	54.2	64.8	68.2
52 - J5 - Castle	3.5	5.0	5.8	5.3	5.6
53 - J5 - Church Road	32.5	41.7	53.2	52.6	56.5
54 - J5 - Station Road LT	1.4	2.3	1.4	3.3	2.9
55 - J5 - Station Road RT	0.7	1.3	0.9	1.5	1.9
56 - J5 - Chapel Hill	44.2	63.1	73.0	83.9	72.9
101 - J10 - Cambridge Road (N) I	24.6	11.3	11.7	13.5	21.5
102 - J10 - Chapel Hill LT	35.0	65.8	73.0	69.3	73.2
103 - J10 - Chapel Hill RT	17.1	26.3	32.8	27.0	27.8
104 - J10 - Silver Street RT	57.6	128.3	116.1	144.6	162.9
105 - J10 Bentfield Road LT	19.5	23.2	21.4	23.9	21.2
106 - J10 Bentfield Road RT	21.1	25.1	24.2	25.2	23.1
991 - Chapel Hill (E)	52.4	78.8	82.0	96.3	95.0
992 - Chapel Hill (W)	65.1	99.0	102.8	106.7	113.2

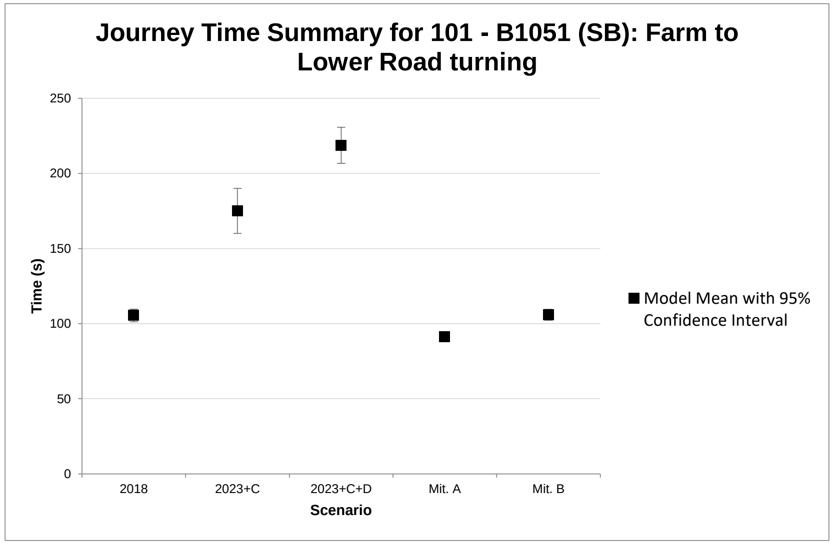
Queue Comparison
AM
Average Length Summary
Maximum Length (m)

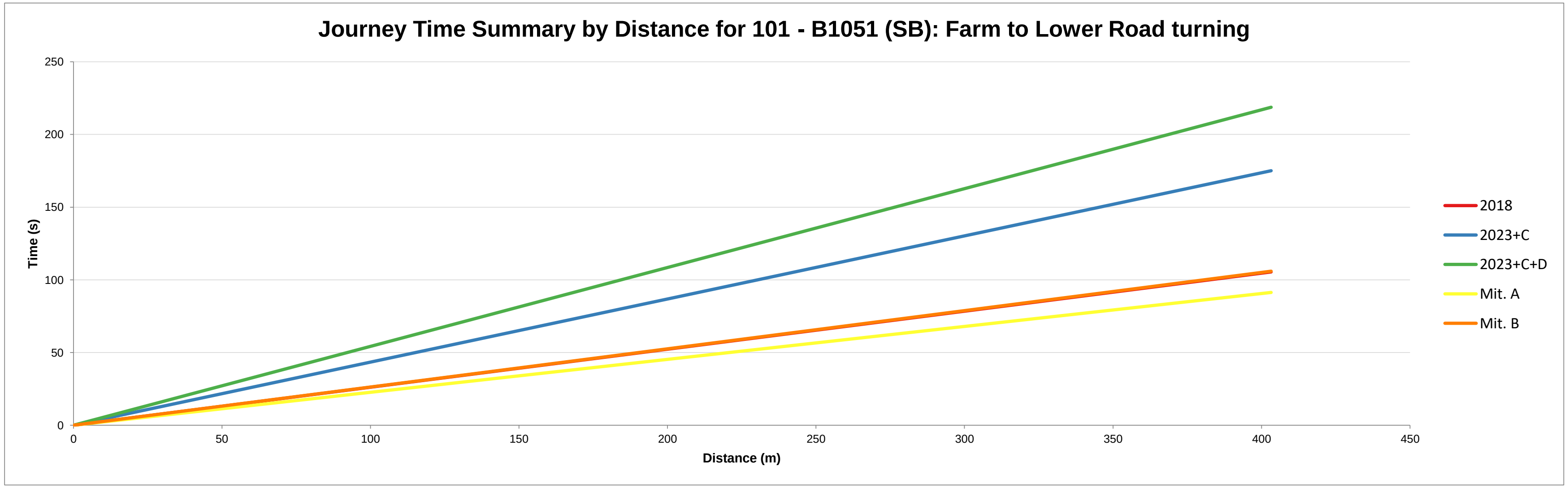
	2018	2023+C	2023+C+D	Mit. A	Mit. B
41 - J4 - Lower Street LT	12.0	24.6	28.5	28.0	28.6
42 - J4 - Lower Street RT	16.8	27.9	31.8	31.3	31.9
43 - J4 - B1051 (N) RT	1.2	1.7	2.7	4.1	4.2
44 - J4 - B1051 (S) Signal Stoplin	37.2	52.1	59.6	69.6	68.6
45 - J4 - B1051 (N) Signal Stoplin	23.8	26.5	27.5	26.5	27.2
46 - Grove Hill (2nd queue)	87.5	192.2	335.4	122.6	139.3
51 - J5 - B1051 (N)	21.1	33.8	39.1	49.4	51.8
52 - J5 - Castle	1.5	2.3	2.6	2.9	3.1
53 - J5 - Church Road	20.2	28.6	32.2	34.9	35.8
54 - J5 - Station Road LT	0.4	0.7	0.5	0.8	0.6
55 - J5 - Station Road RT	0.3	0.4	0.3	0.5	0.4
56 - J5 - Chapel Hill	18.4	28.5	34.2	40.8	37.9
101 - J10 - Cambridge Road (N) I	5.3	6.4	6.8	6.1	8.9
102 - J10 - Chapel Hill LT	19.4	32.7	40.1	44.2	44.3
103 - J10 - Chapel Hill RT	13.8	17.3	16.9	19.1	17.7
104 - J10 - Silver Street RT	37.2	73.9	74.3	81.6	84.6
105 - J10 Bentfield Road LT	11.3	15.1	14.7	15.0	14.5
106 - J10 Bentfield Road RT	13.5	16.4	16.3	16.7	16.1
991 - Chapel Hill (E)	38.5	62.4	71.6	78.0	78.3
992 - Chapel Hill (W)	39.6	61.7	71.3	77.0	77.2

Journey Time Comparison Graphs
AM
08:00 - 09:00
Mit

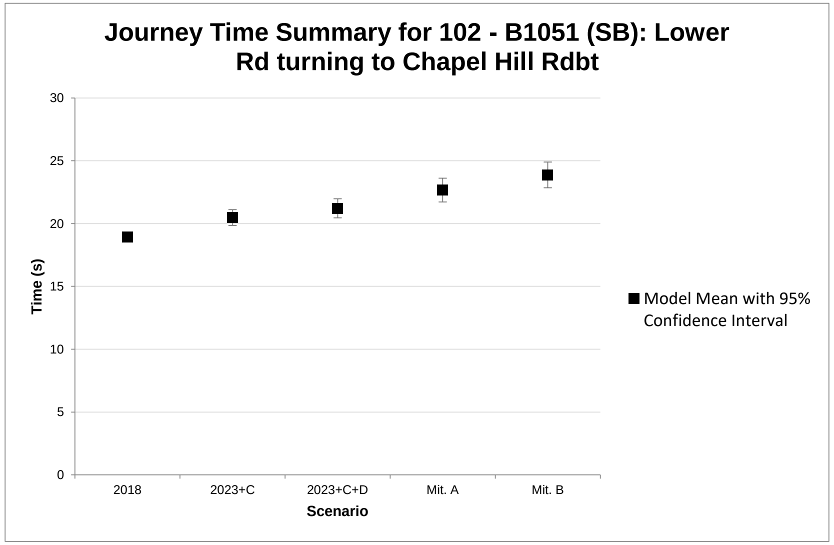


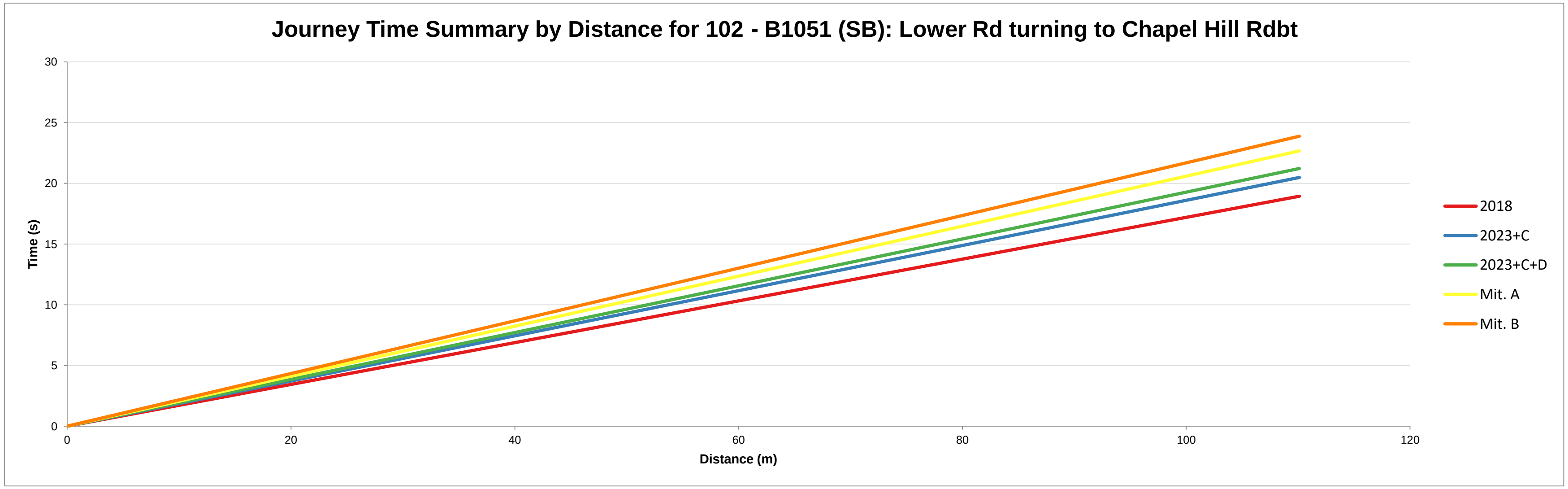
Journey Time Comparison Graphs
AM
08:00 - 09:00
Mit



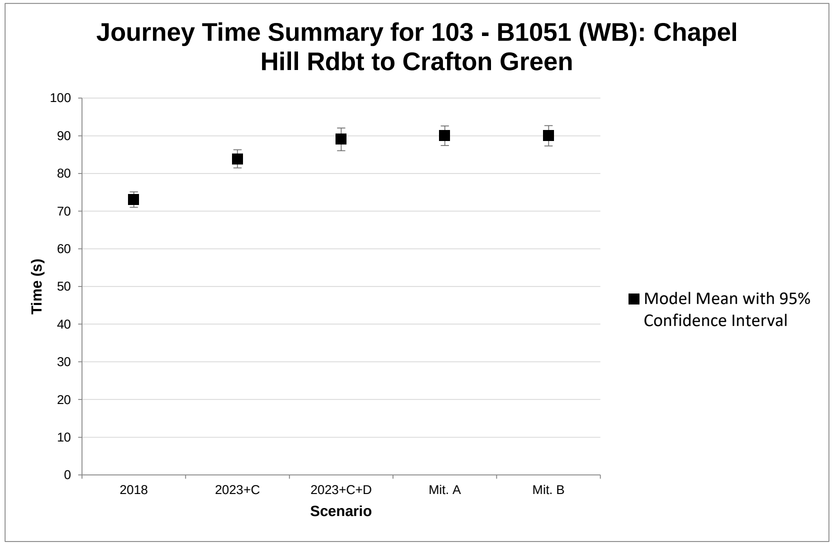


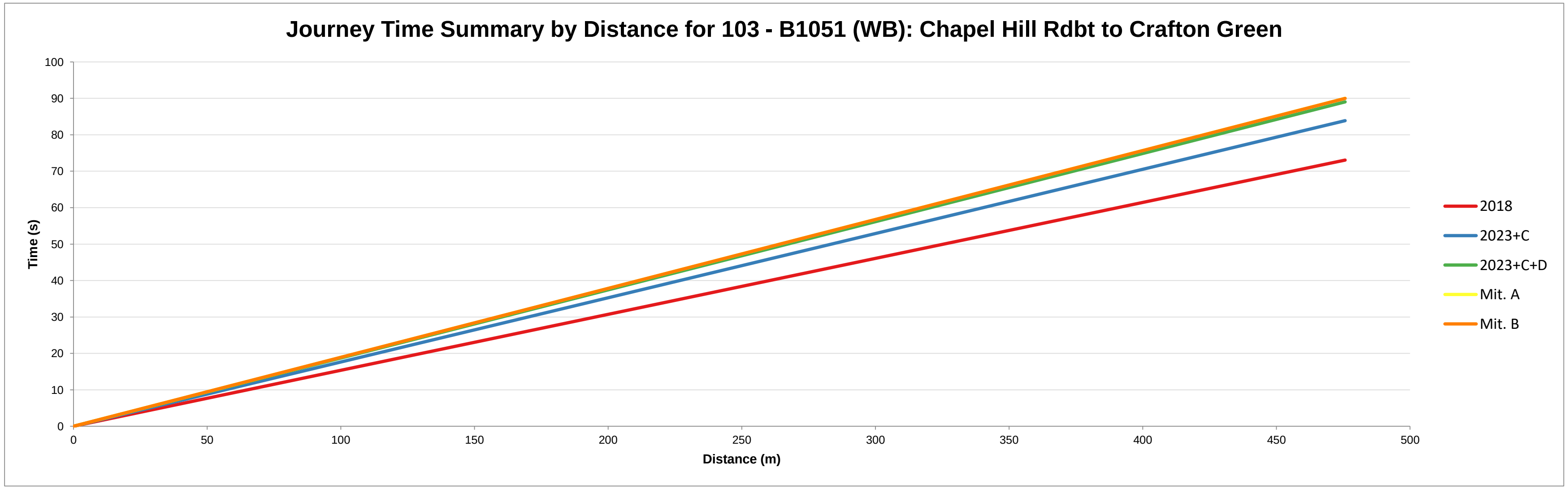
Journey Time Comparison Graphs
AM
08:00 - 09:00
Mit

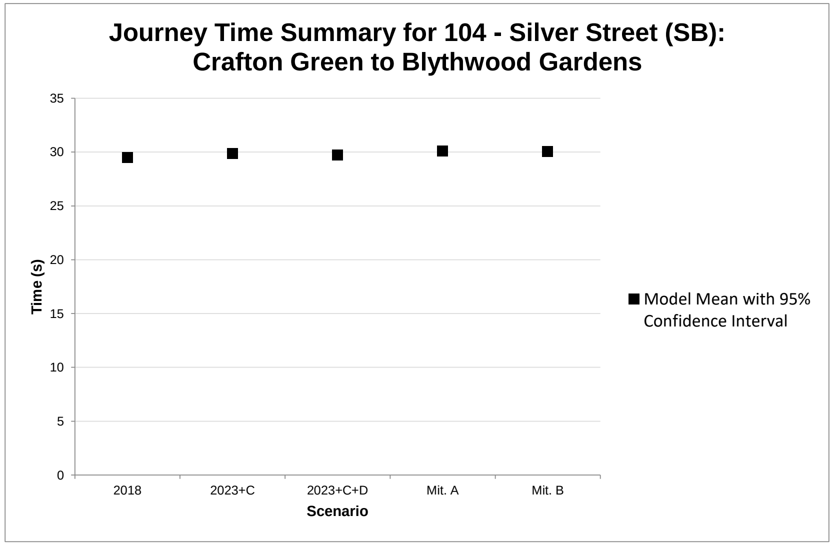


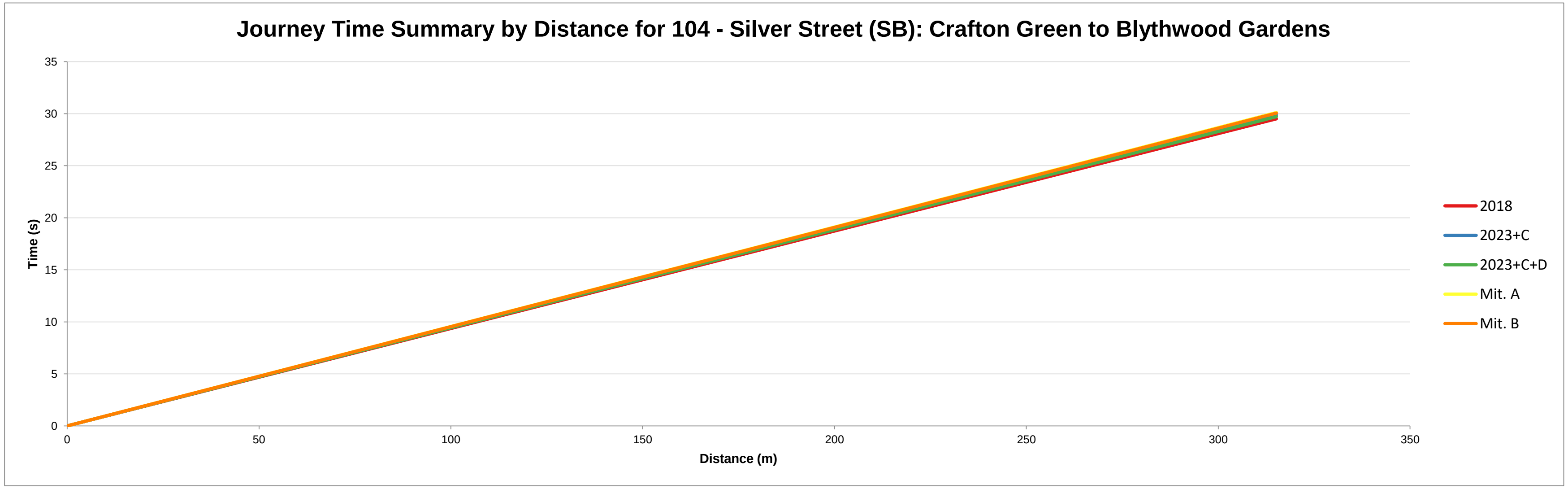


Journey Time Comparison Graphs
AM
08:00 - 09:00
Mit

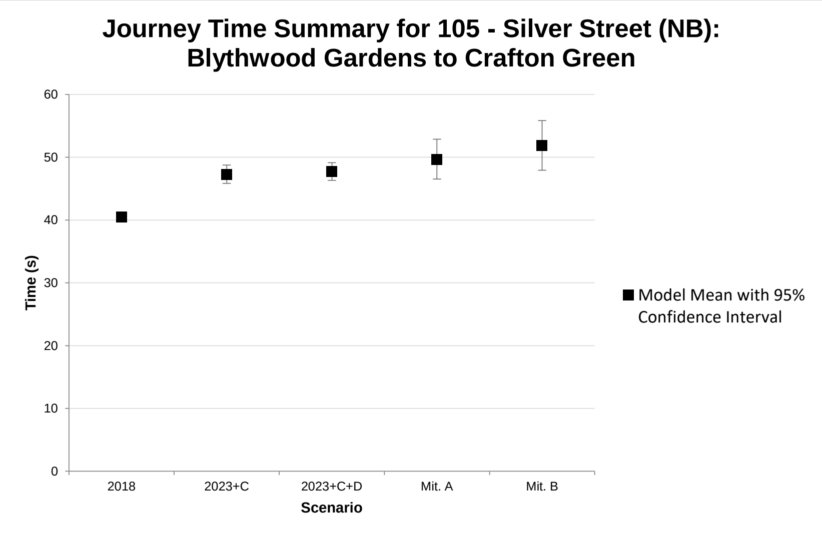


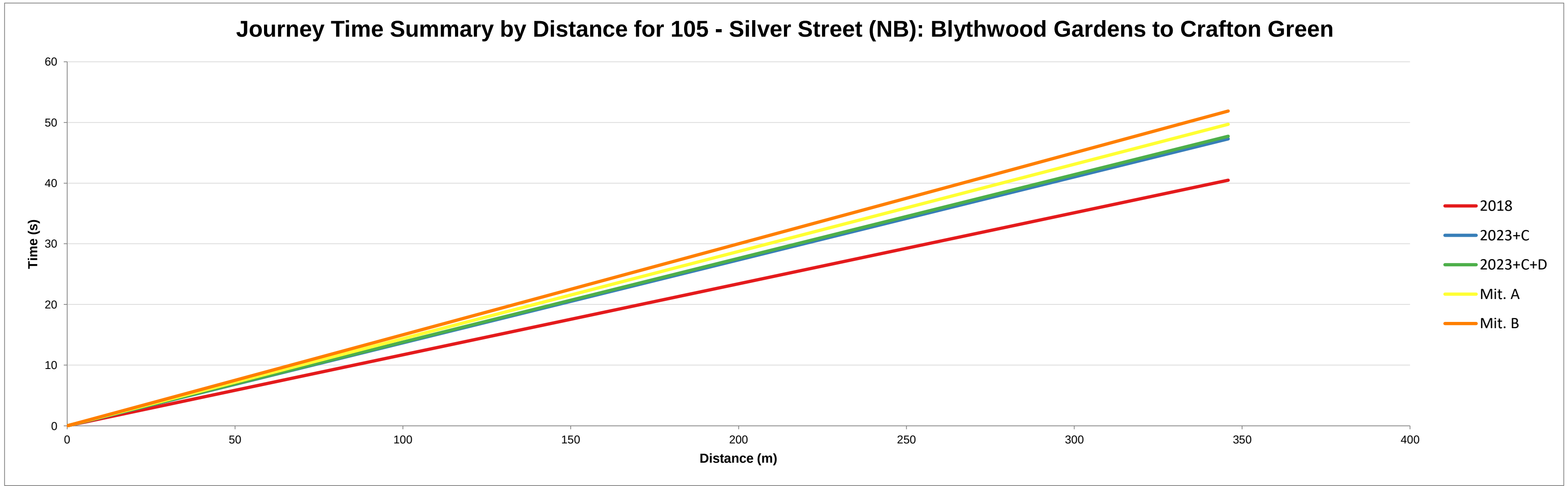


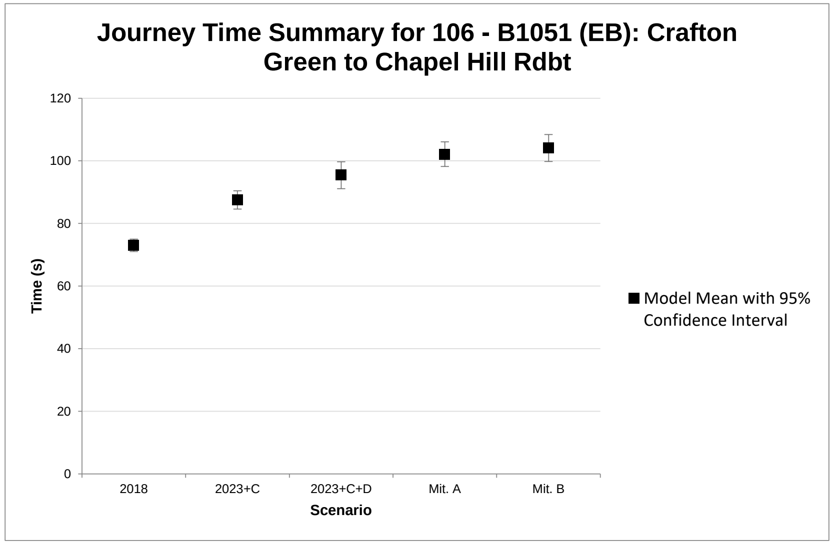

Journey Time Summary for 104 - Silver Street (SB): Crafton Green to Blythwood Gardens
Time (s)
35
30
25
20
15
10
5
0
2018
2023+C
2023+C+D
Mit. A
Mit. B
Scenario
Model Mean with 95% Confidence Interval

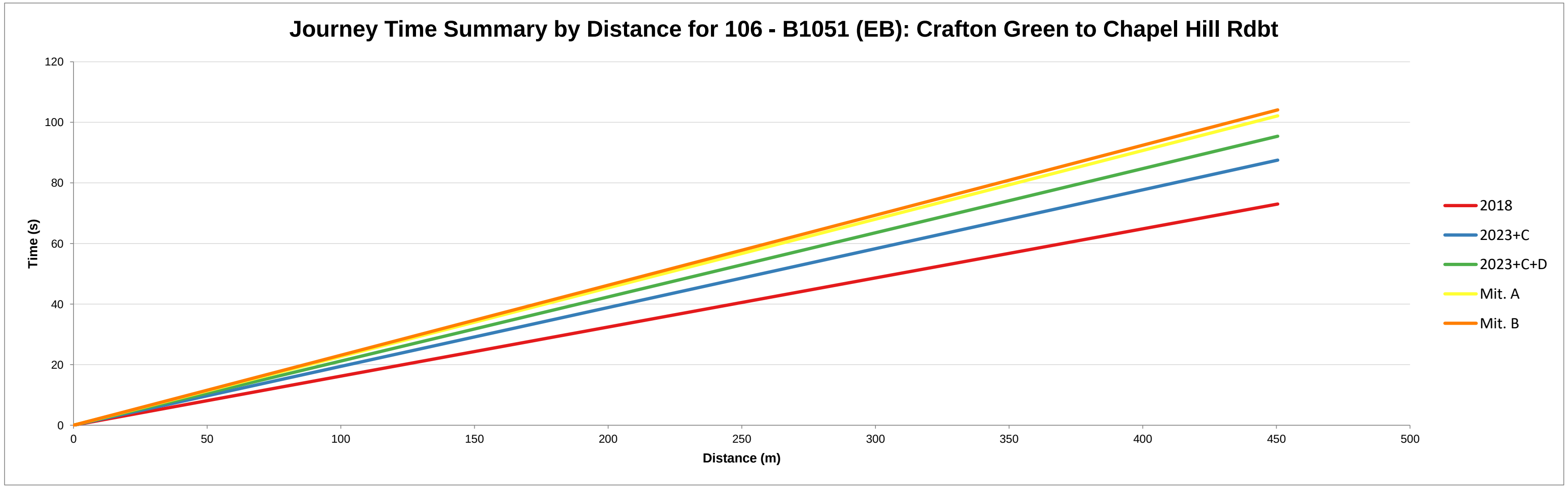

Journey Time Summary by Distance for 104 - Silver Street (SB): Crafton Green to Blythwood Gardens
Time (s)
35
30
25
20
15
10
5
0
0
50
100
150
200
250
300
350
Distance (m)
2018
2023+C
2023+C+D
Mit. A
Mit. B

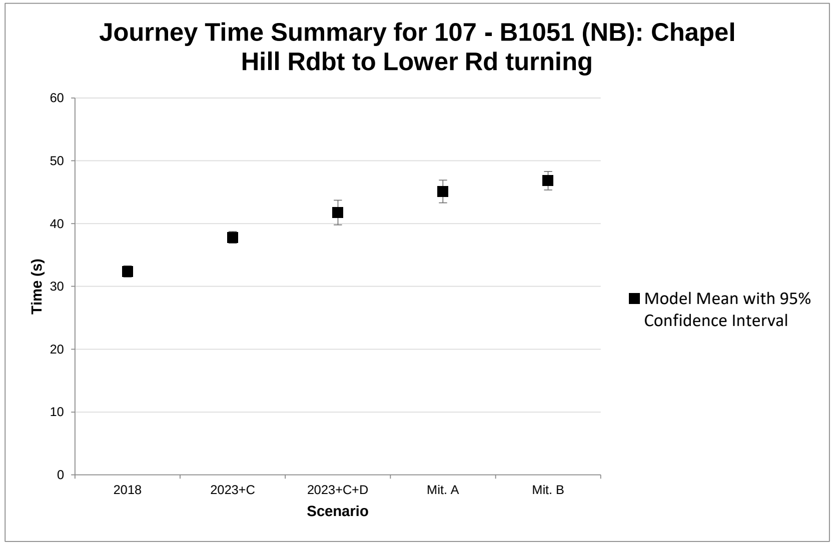
Journey Time Comparison Graphs
AM
08:00 - 09:00
Mit

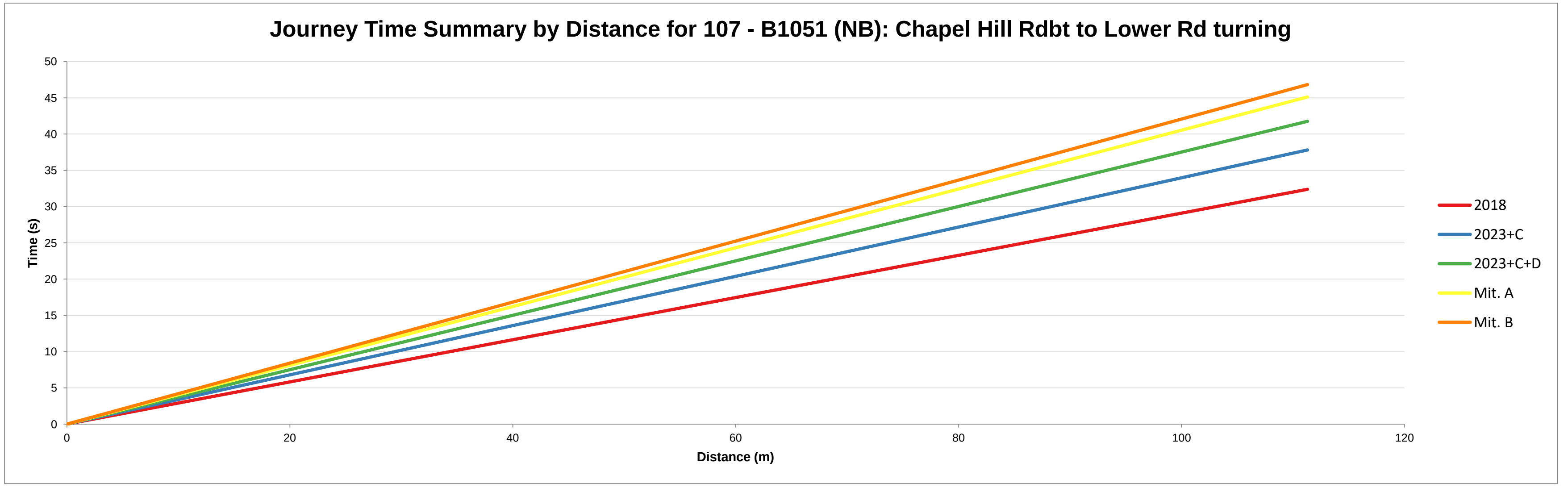


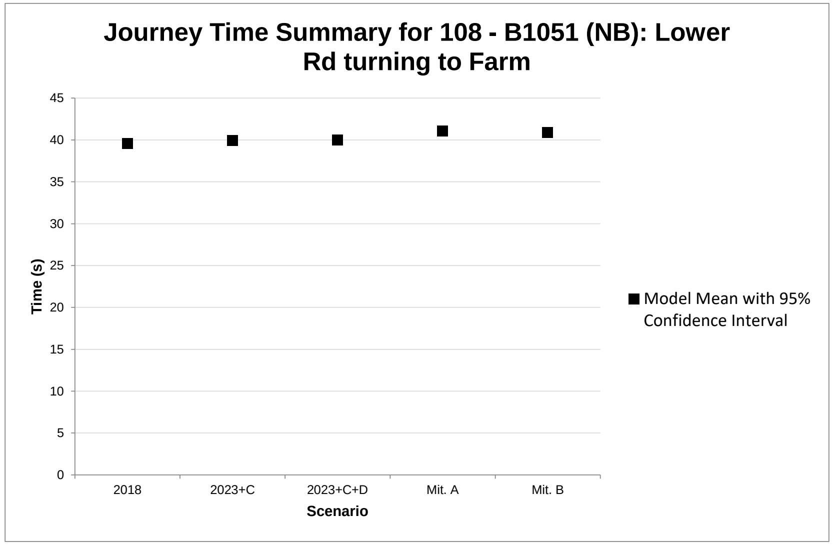


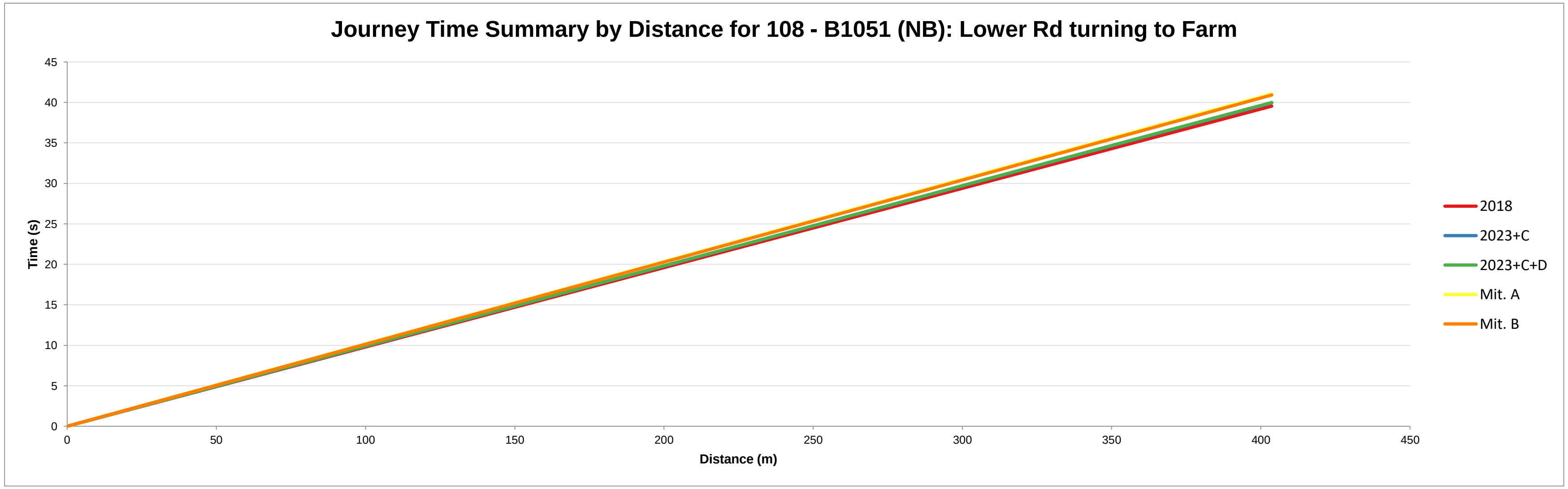

Journey Time Summary for 106 - B1051 (EB): Crafton Green to Chapel Hill Rdbt
Time (s)
120
100
80
60
40
20
0
2018
2023+C
2023+C+D
Mit. A
Mit. B
Scenario
Model Mean with 95% Confidence Interval

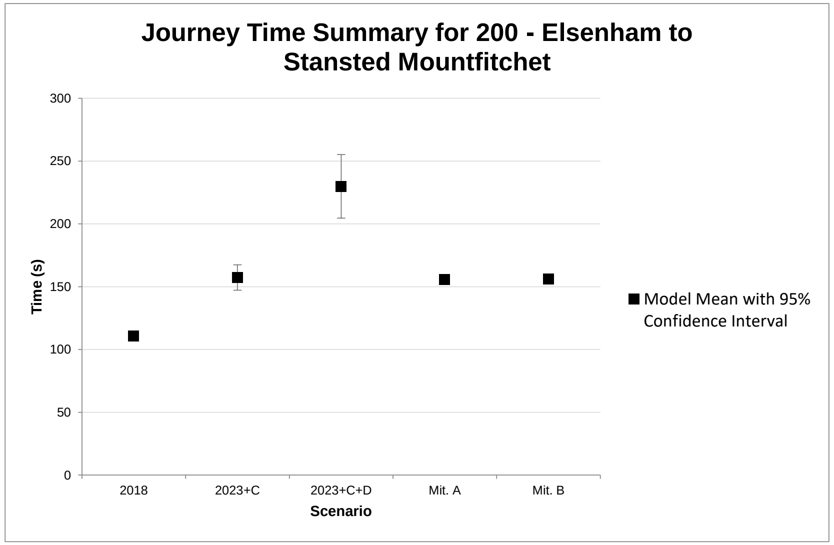

Journey Time Summary by Distance for 106 - B1051 (EB): Crafton Green to Chapel Hill Rdbt
Time (s)
120
100
80
60
40
20
0
0
50
100
150
200
250
300
350
400
450
500
Distance (m)
2018
2023+C
2023+C+D
Mit. A
Mit. B

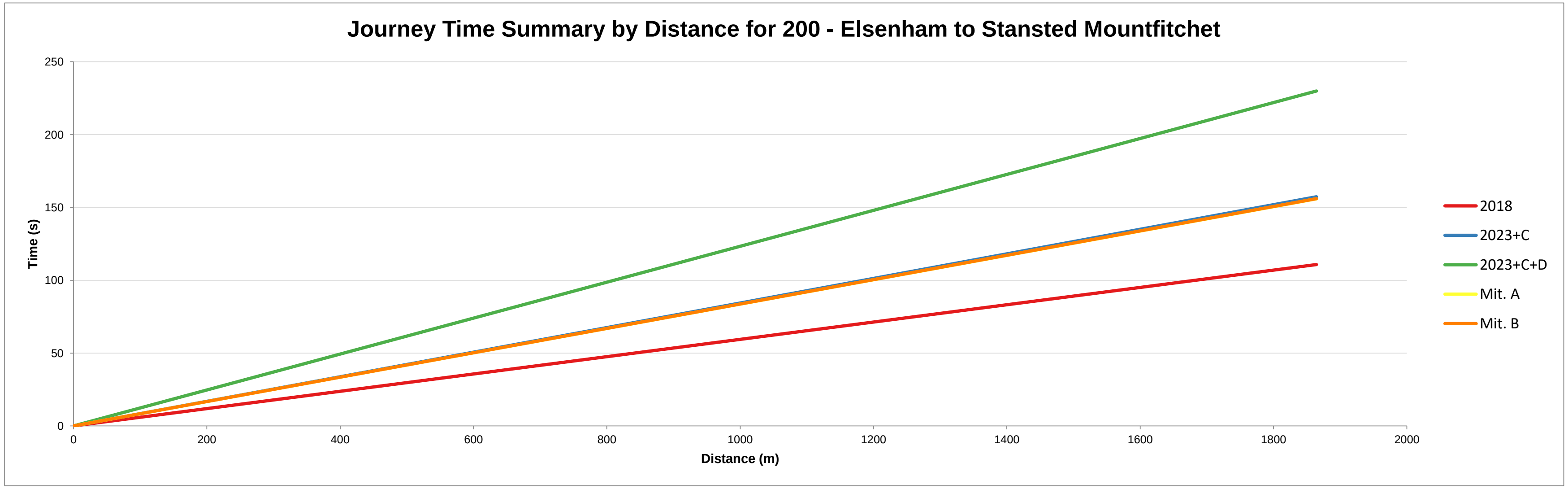

Journey Time Summary for 107 - B1051 (NB): Chapel Hill Rdbt to Lower Rd turning
Time (s)
60
50
40
30
20
10
0
2018
2023+C
2023+C+D
Mit. A
Mit. B
Scenario
Model Mean with 95% Confidence Interval


Journey Time Summary by Distance for 107 - B1051 (NB): Chapel Hill Rdbt to Lower Rd turning
Time (s)
50
45
40
35
30
25
20
15
10
5
0
0
20
40
60
80
100
120
Distance (m)
2018
2023+C
2023+C+D
Mit. A
Mit. B

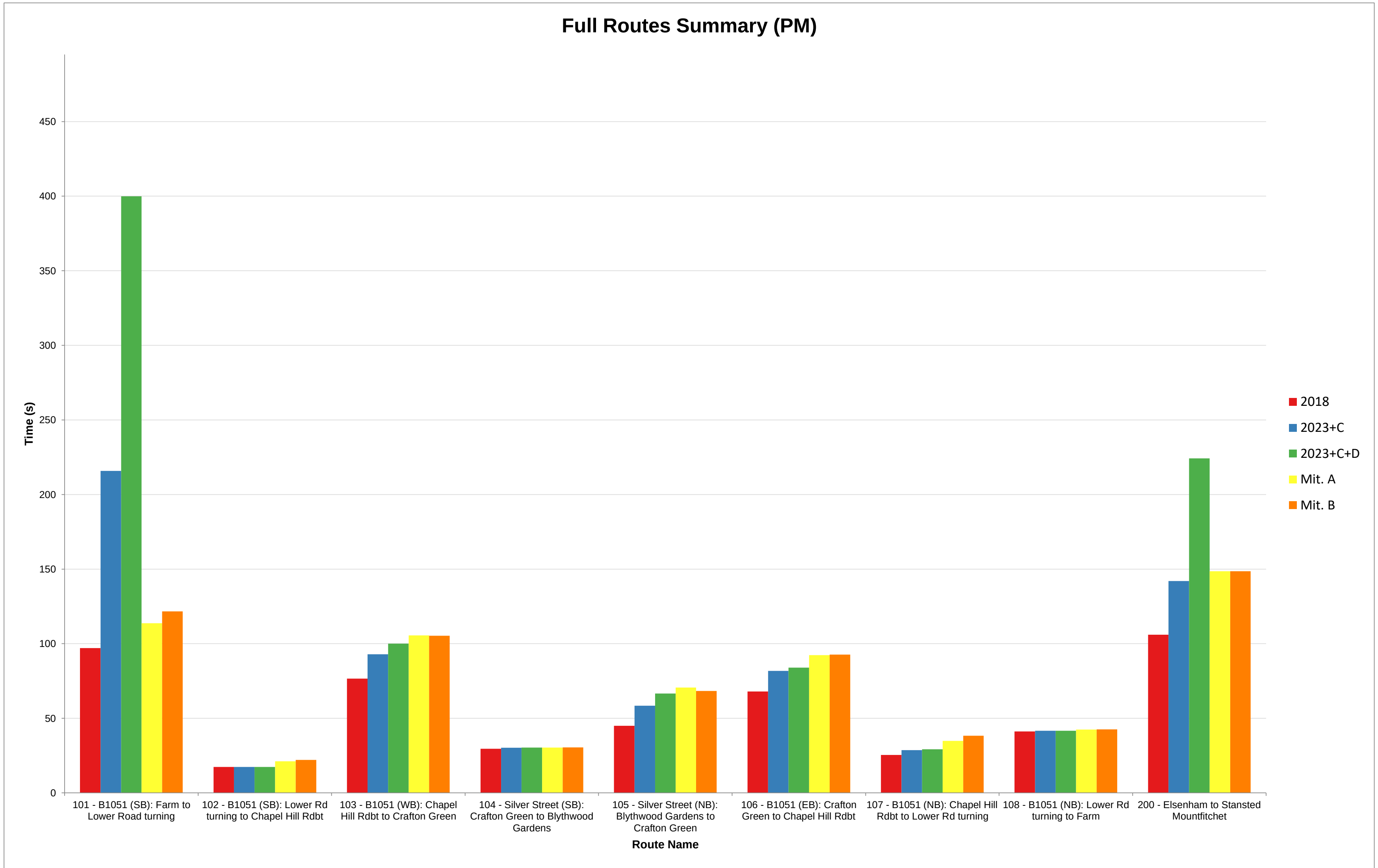

Journey Time Summary for 108 - B1051 (NB): Lower Rd turning to Farm
Time (s)
45
40
35
30
25
20
15
10
5
0
2018
2023+C
2023+C+D
Mit. A
Mit. B
Scenario
Model Mean with 95% Confidence Interval


Journey Time Summary by Distance for 108 - B1051 (NB): Lower Rd turning to Farm
Time (s)
45
40
35
30
25
20
15
10
5
0
0
50
100
150
200
250
300
350
400
450
Distance (m)
2018
2023+C
2023+C+D
Mit. A
Mit. B


Journey Time Summary for 200 - Elsenham to Stansted Mountfitchet
300
250
200
150
100
50
0
Time (s)
2018
2023+C
2023+C+D
Mit. A
Mit. B
Scenario
Model Mean with 95% Confidence Interval

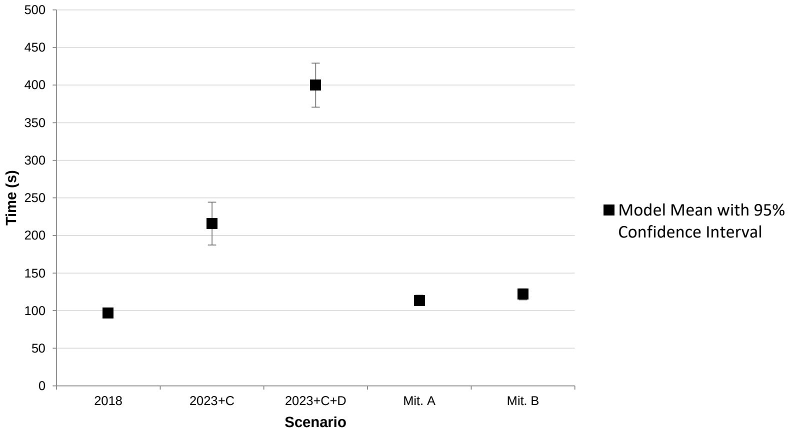

Journey Time Summary by Distance for 200 - Elsenham to Stansted Mountfitchet
250
200
150
100
50
0
Time (s)
0
200
400
600
800
1000
1200
1400
1600
1800
2000
Distance (m)
2018
2023+C
2023+C+D
Mit. A
Mit. B

Journey Time Comparison Graphs
PM
17:00 - 18:00
Mit

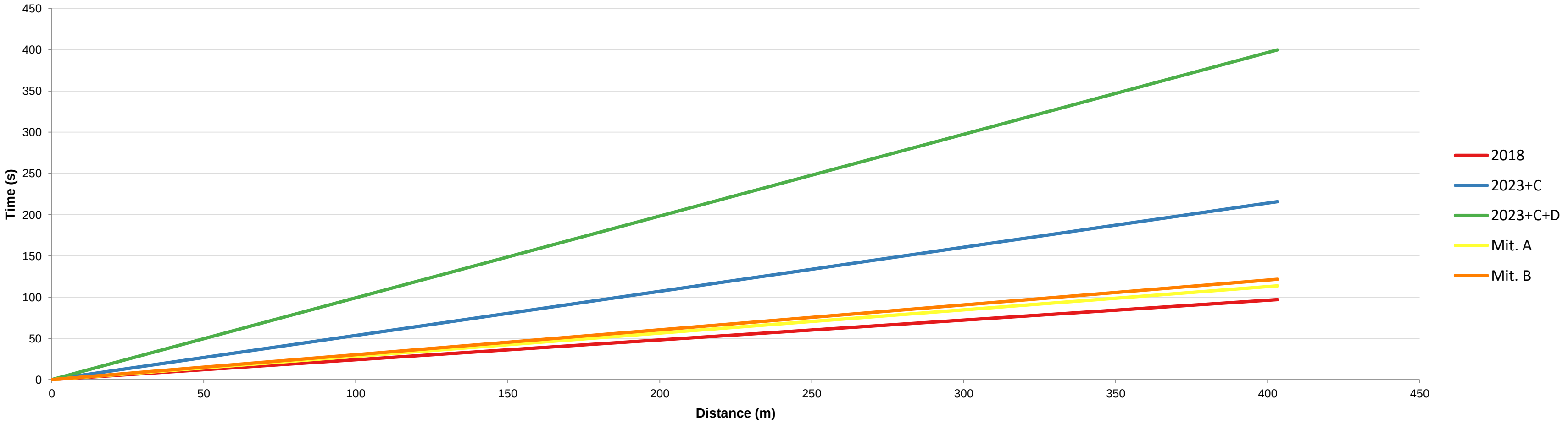


Journey Time Comparison Graphs
PM
17:00 - 18:00
Mit

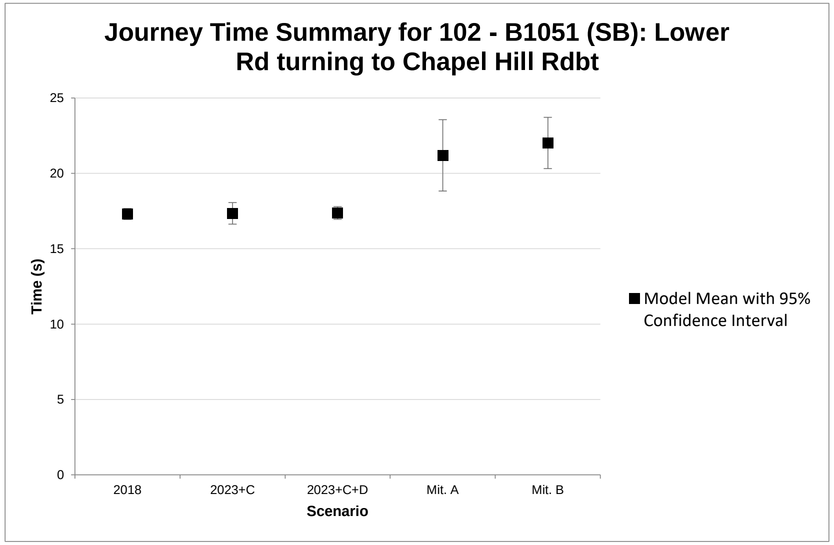
Journey Time Summary for 101 - B1051 (SB): Farm to Lower Road turning

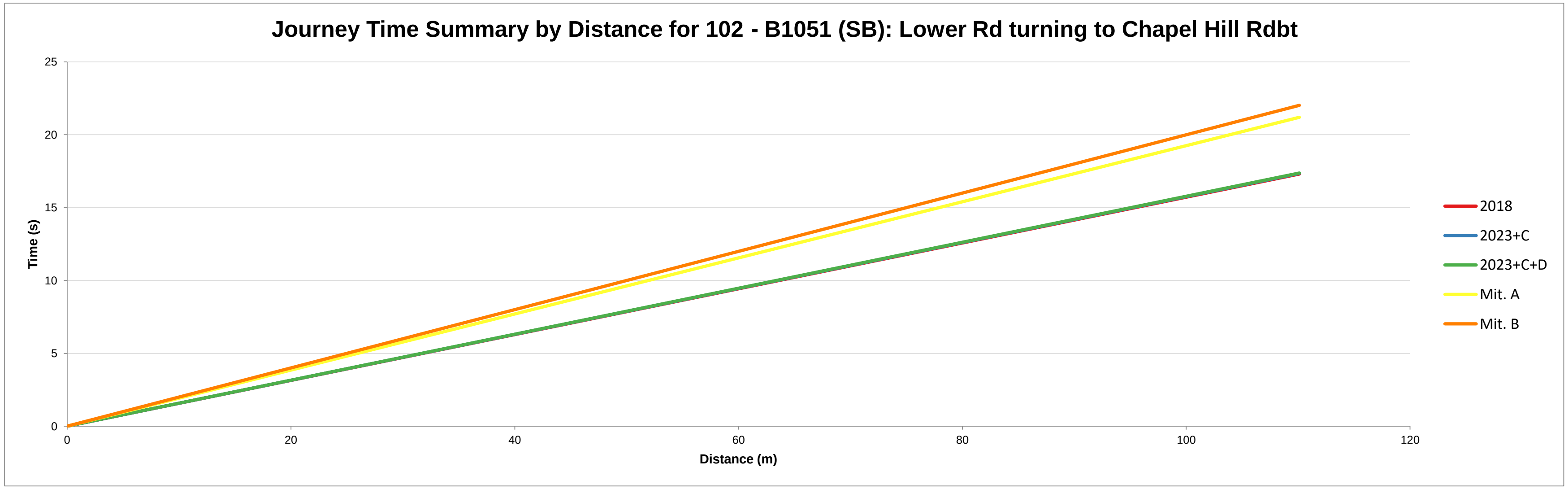


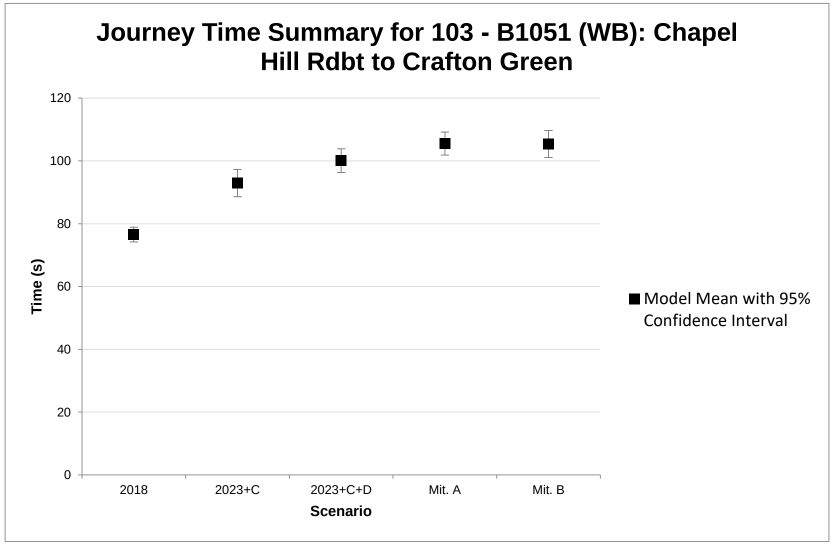
Journey Time Summary by Distance for 101 - B1051 (SB): Farm to Lower Road turning

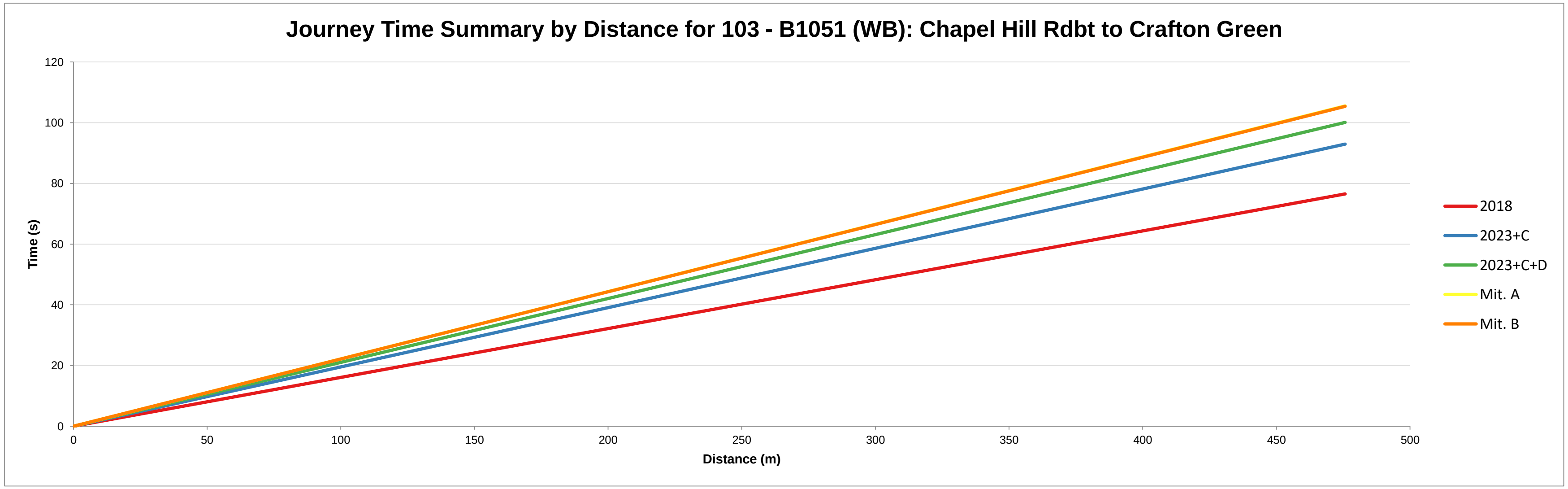


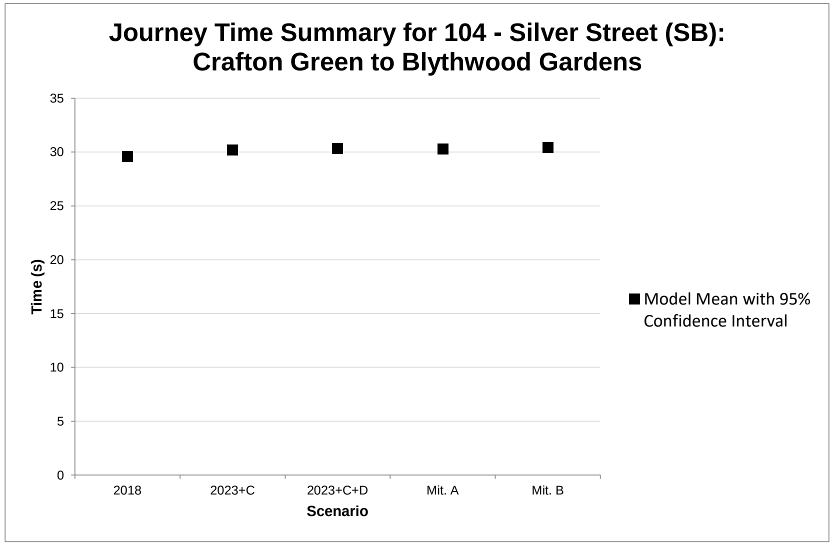
Journey Time Comparison Graphs
PM
17:00 - 18:00
Mit

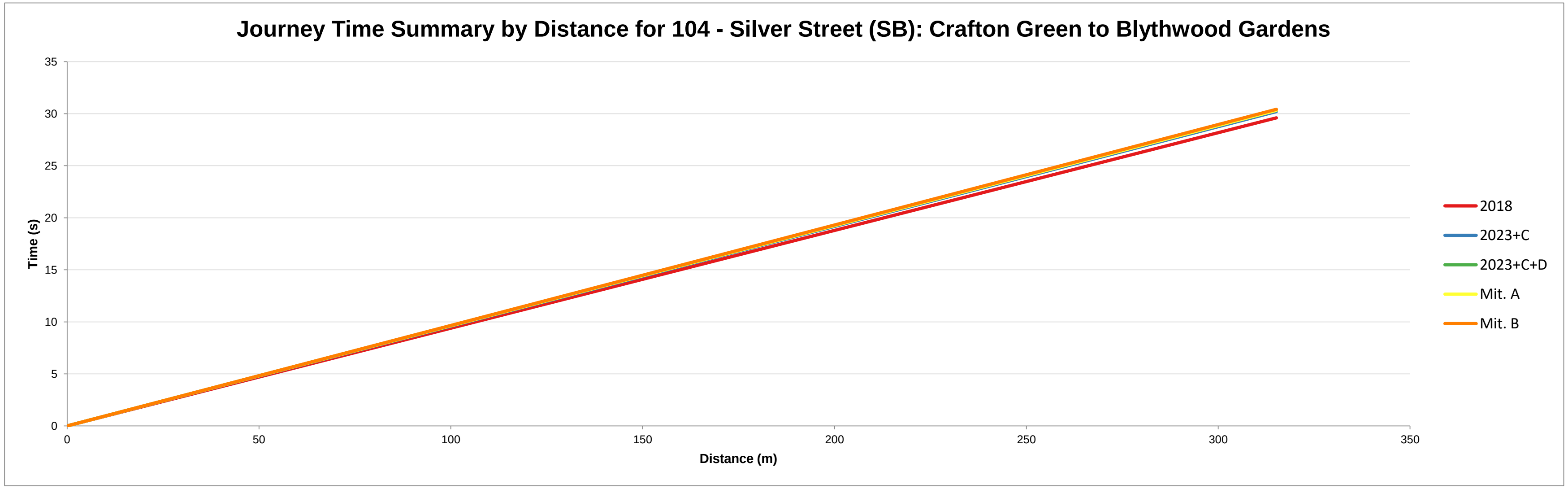


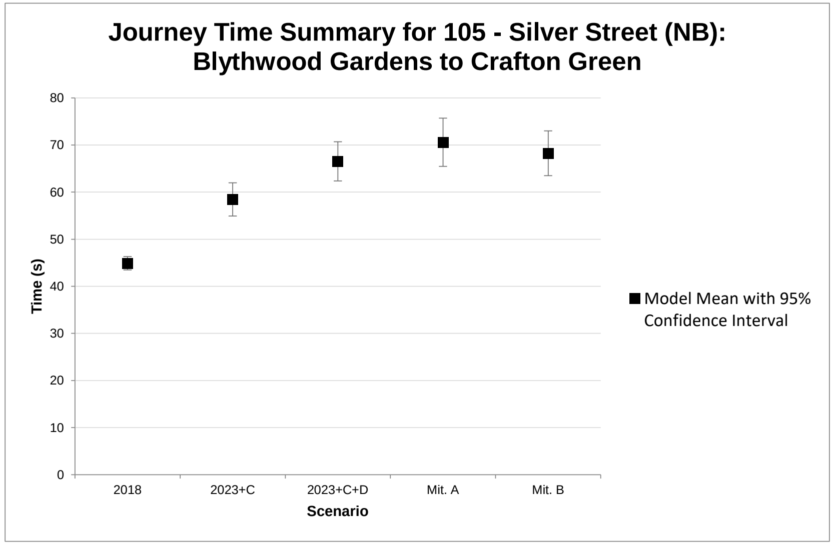


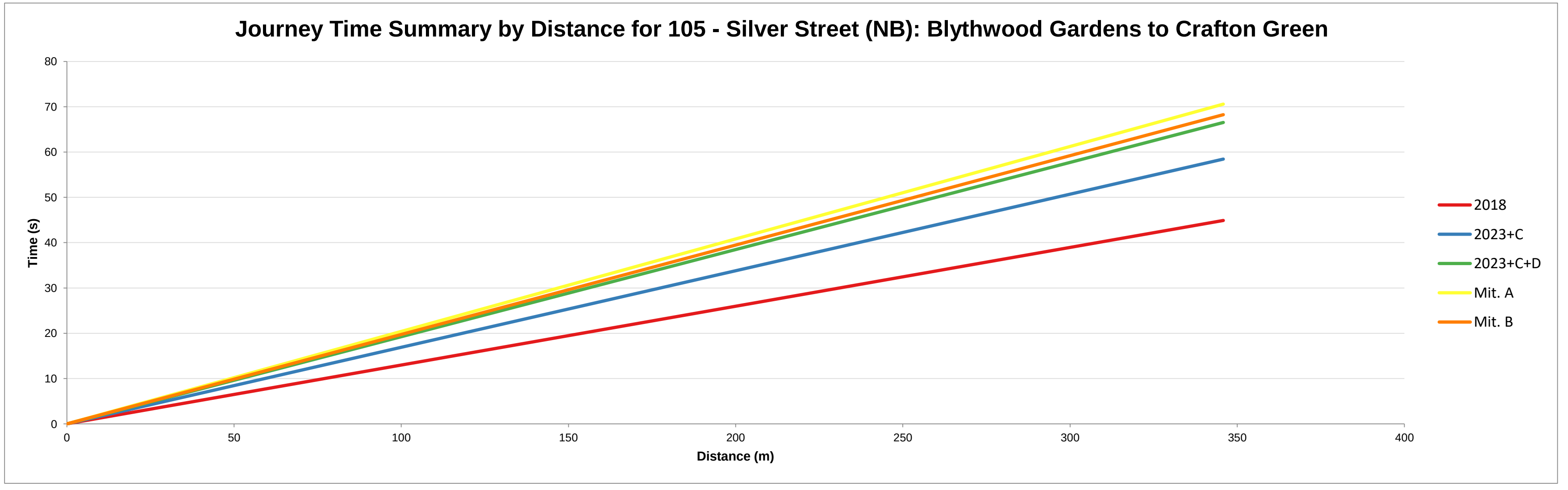

Journey Time Summary for 103 - B1051 (WB): Chapel Hill Rdbt to Crafton Green
Time (s)
0
20
40
60
80
100
120
2018
2023+C
2023+C+D
Mit. A
Mit. B
Scenario
Model Mean with 95% Confidence Interval

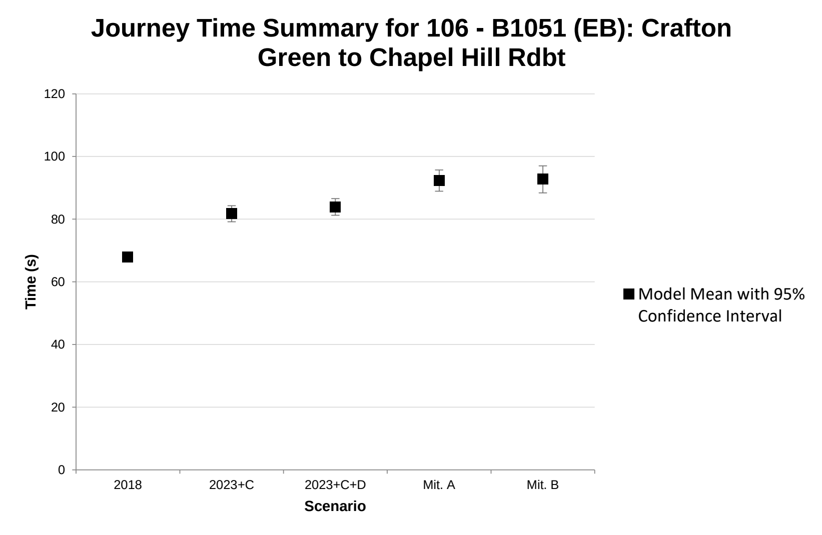

Journey Time Summary by Distance for 103 - B1051 (WB): Chapel Hill Rdbt to Crafton Green
Time (s)
0
20
40
60
80
100
120
0
50
100
150
200
250
300
350
400
450
500
Distance (m)
2018
2023+C
2023+C+D
Mit. A
Mit. B

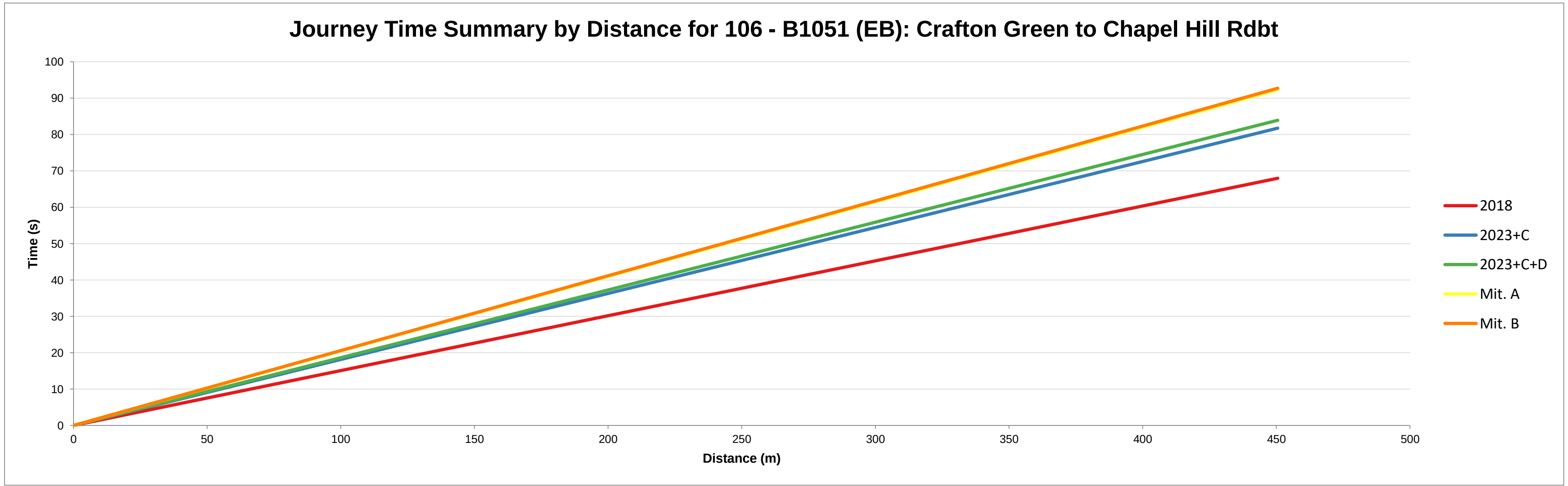

Journey Time Summary for 104 - Silver Street (SB): Crafton Green to Blythwood Gardens
Time (s)
35
30
25
20
15
10
5
0
2018
2023+C
2023+C+D
Mit. A
Mit. B
Scenario
Model Mean with 95% Confidence Interval

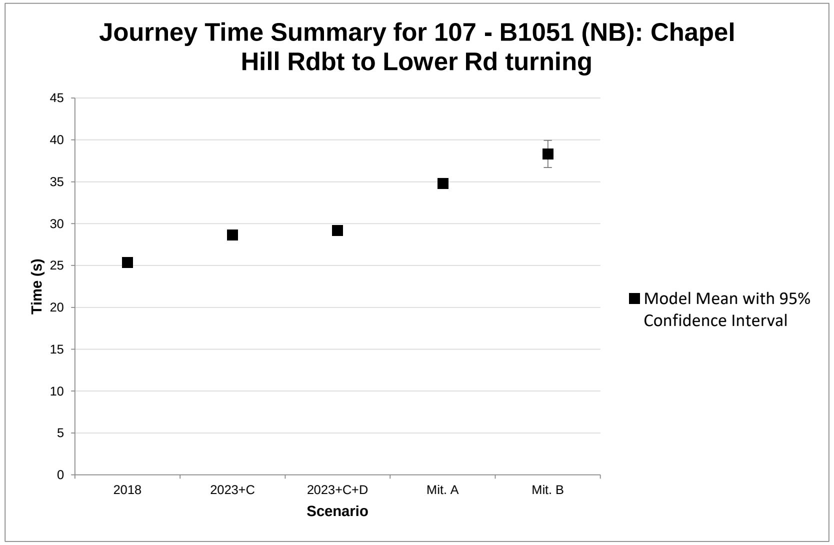

Journey Time Summary by Distance for 104 - Silver Street (SB): Crafton Green to Blythwood Gardens
Time (s)
35
30
25
20
15
10
5
0
0
50
100
150
200
250
300
350
Distance (m)
2018
2023+C
2023+C+D
Mit. A
Mit. B

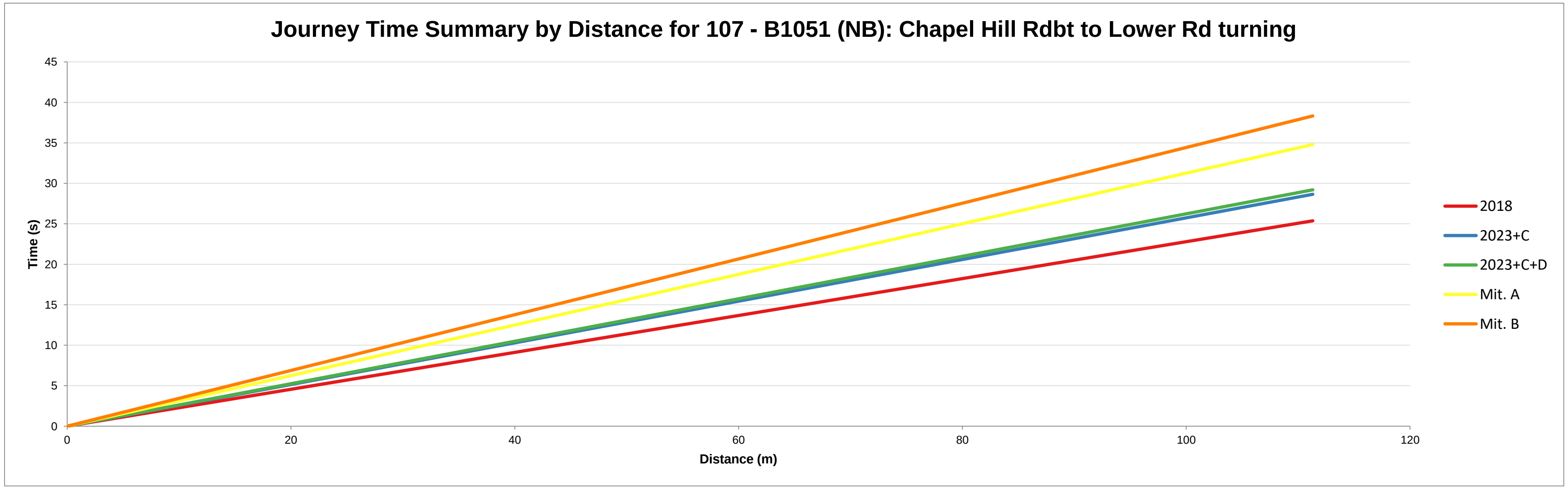

Journey Time Summary for 105 - Silver Street (NB): Blythwood Gardens to Crafton Green
Time (s)
0
10
20
30
40
50
60
70
80
2018
2023+C
2023+C+D
Mit. A
Mit. B
Scenario
Model Mean with 95% Confidence Interval


Journey Time Summary by Distance for 105 - Silver Street (NB): Blythwood Gardens to Crafton Green
Time (s)
0
10
20
30
40
50
60
70
80
0
50
100
150
200
250
300
350
400
Distance (m)
2018
2023+C
2023+C+D
Mit. A
Mit. B

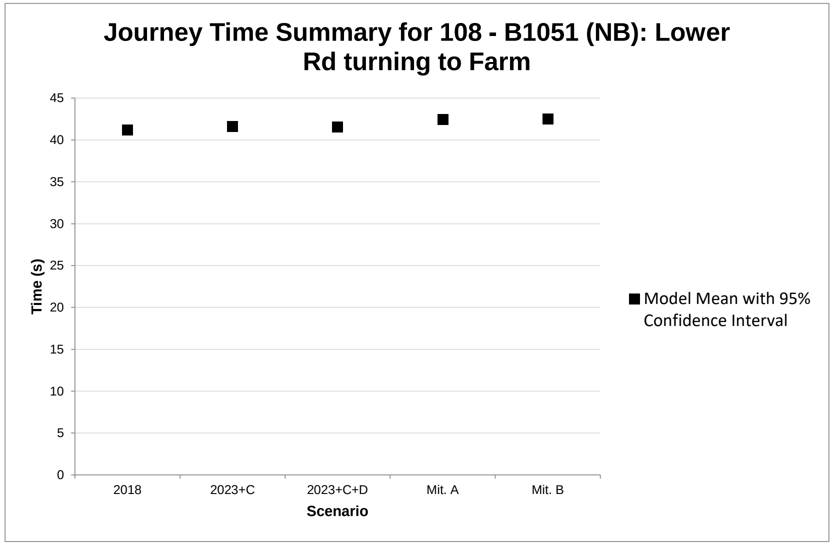

Journey Time Summary for 106 - B1051 (EB): Crafton Green to Chapel Hill Rdbt
120
100
80
60
40
20
0
Time (s)
2018
2023+C
2023+C+D
Mit. A
Mit. B
Scenario
Model Mean with 95% Confidence Interval

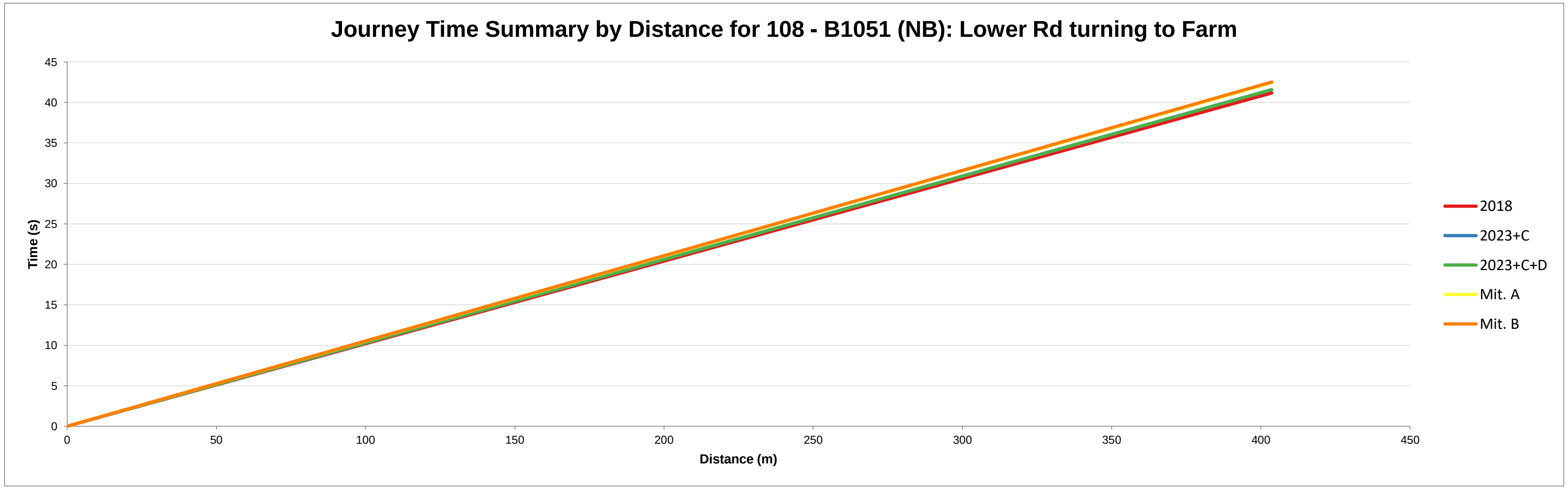

Journey Time Summary by Distance for 106 - B1051 (EB): Crafton Green to Chapel Hill Rdbt
100
90
80
70
60
50
40
30
20
10
0
Time (s)
0
50
100
150
200
250
300
350
400
450
500
Distance (m)
2018
2023+C
2023+C+D
Mit. A
Mit. B


Journey Time Summary for 107 - B1051 (NB): Chapel Hill Rdbt to Lower Rd turning
Time (s)
45
40
35
30
25
20
15
10
5
0
2018
2023+C
2023+C+D
Mit. A
Mit. B
Scenario
Model Mean with 95% Confidence Interval

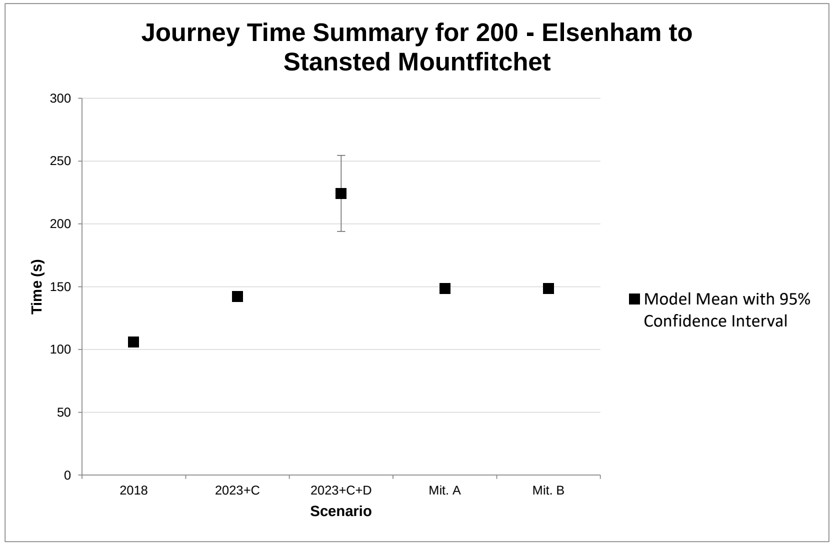

Journey Time Summary by Distance for 107 - B1051 (NB): Chapel Hill Rdbt to Lower Rd turning
Time (s)
45
40
35
30
25
20
15
10
5
0
0
20
40
60
80
100
120
Distance (m)
2018
2023+C
2023+C+D
Mit. A
Mit. B

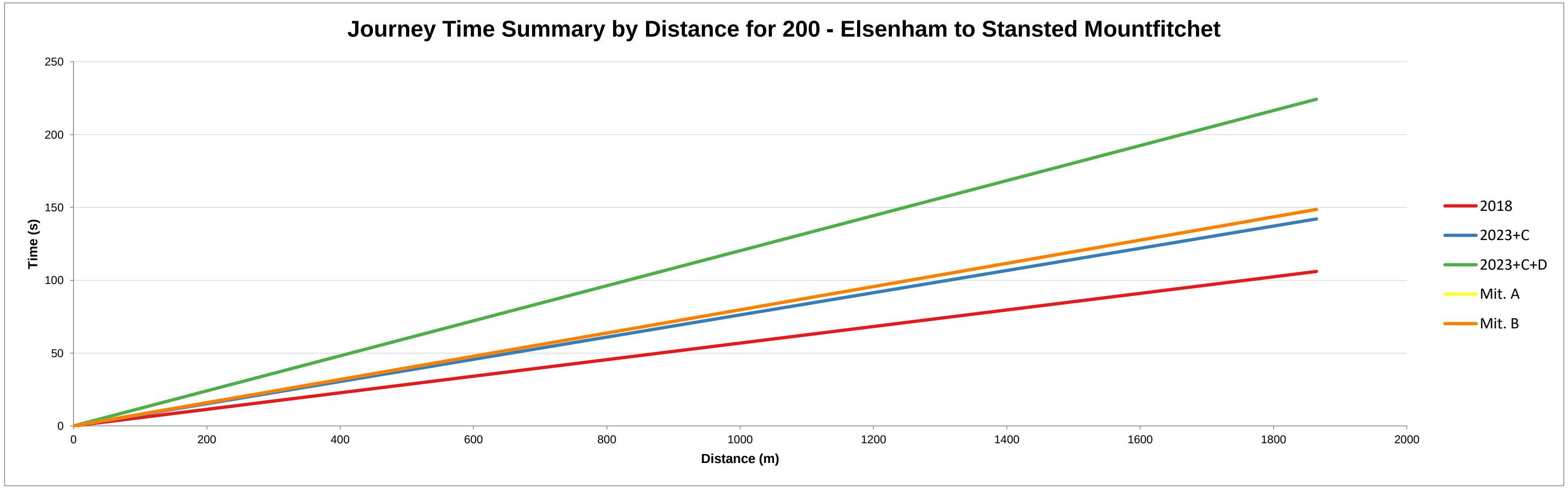
Journey Time Comparison Graphs
PM
17:00 - 18:00
Mit





Journey Time Comparison Graphs
PM
17:00 - 18:00
Mit



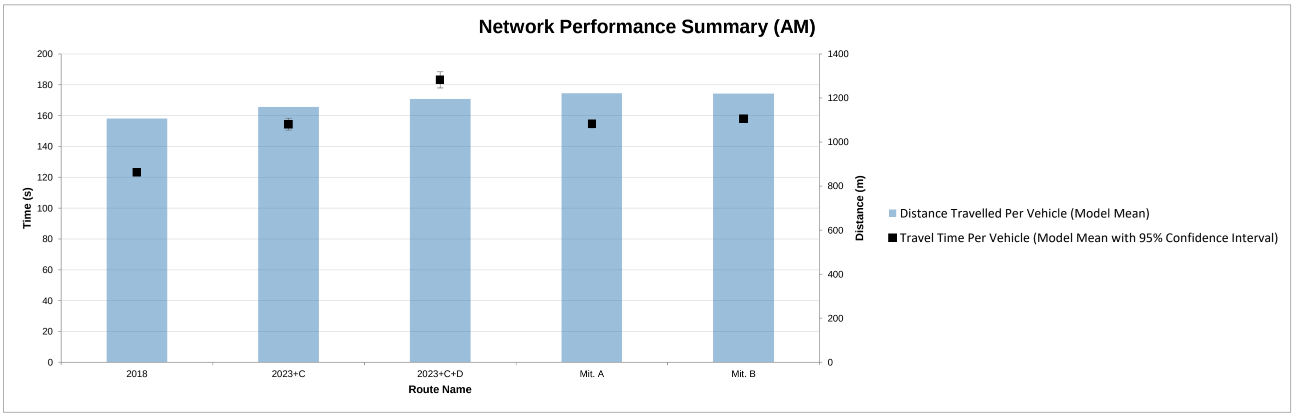


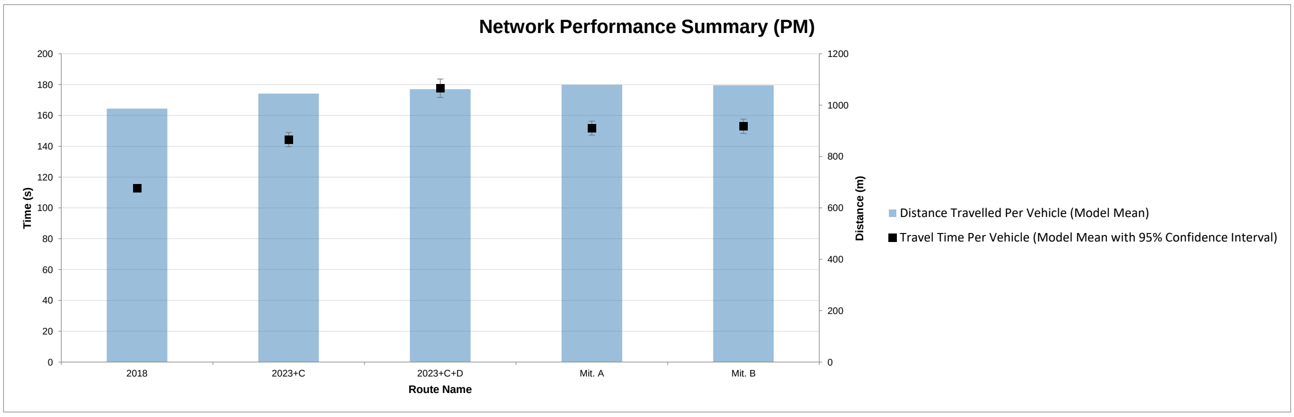
Journey Time Table
AM

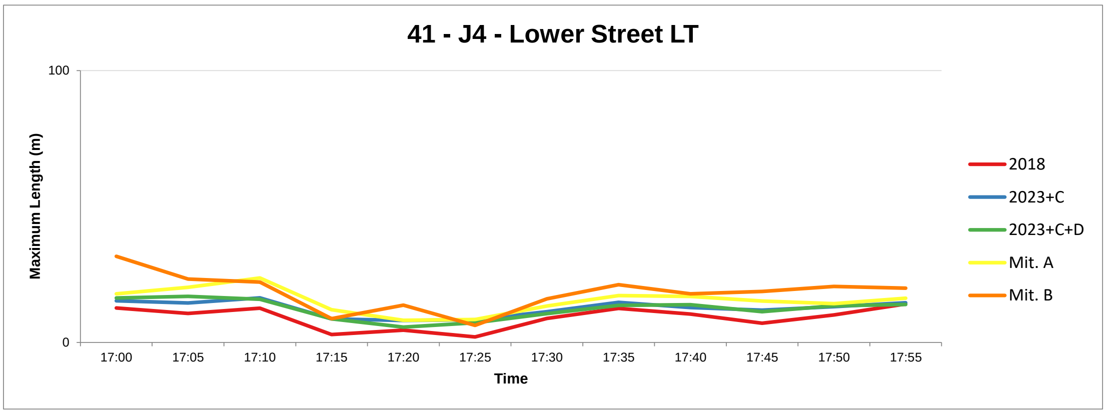
Route Names	2018	2023+C	2023+C+D	Mit. A	Mit. B
101 - B1051 (SB): Farm to Lower	105	175	219	91	106
102 - B1051 (SB): Lower Rd turni	19	20	21	23	24
103 - B1051 (WB): Chapel Hill Rd	73	84	89	90	90
104 - Silver Street (SB): Crafton G	30	30	30	30	30
105 - Silver Street (NB): Blythwod	40	47	48	50	52
106 - B1051 (EB): Crafton Green	73	88	95	102	104
107 - B1051 (NB): Chapel Hill Rd	32	38	42	45	47
108 - B1051 (NB): Lower Rd turni	40	40	40	41	41
200 - Elsenham to Stansted Mour	111	157	230	156	156

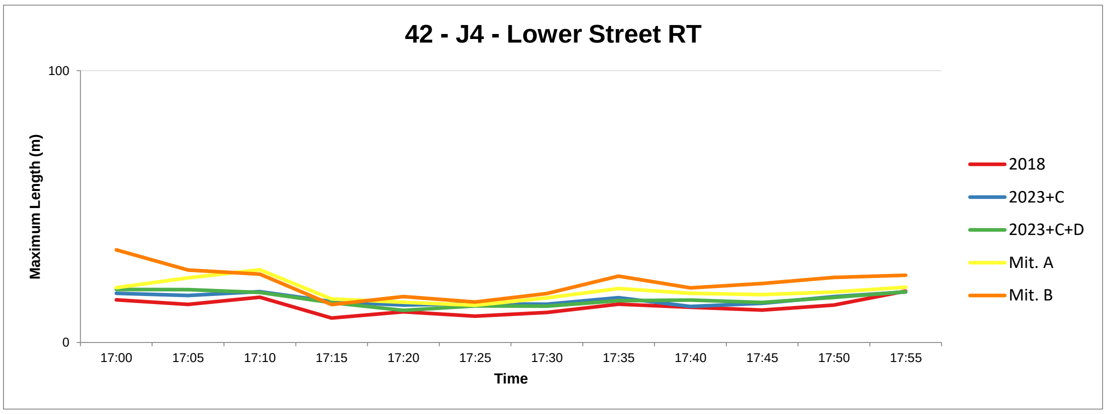
Network Performance Summary

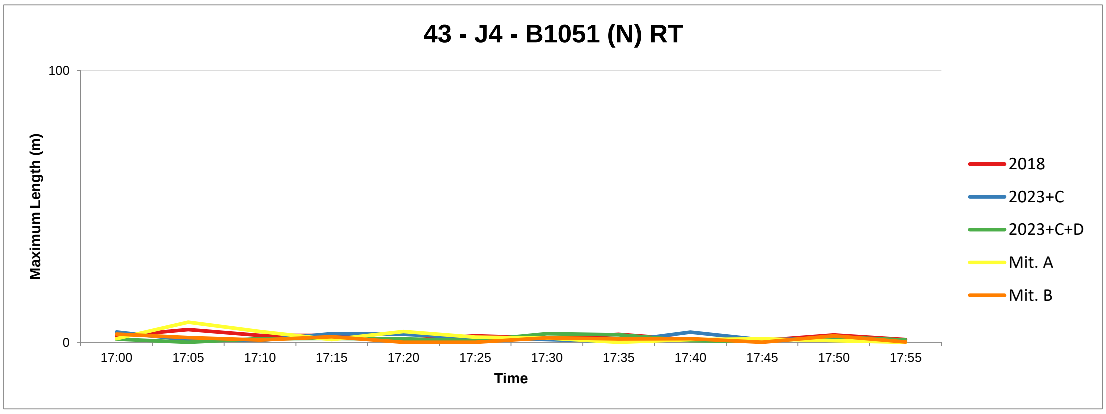
	2018 (AM)	2023+C (AM)	2023+C+D (AM)	Mit. A (AM)	Mit. B (AM)	2018 (PM)	2023+C (PM)	2023+C+D (PM)	Mit. A (PM)	Mit. B (PM)
Total Time Taken (s)	270109	390612	482132	405994	415310	270439	394680	504200	430351	434393
Total Distance (m)	2425766	2933168	3146634	3208474	3206617	2364629	2857695	3014888	3059806	3059033
Total Vehicles	2192	2530	2632	2626	2628	2397	2735	2838	2835	2840
Total Delay (s)	80372	161496	236315	155378	164860	78069	163897	261224	183714	187812
Average Time (s) / Vehicle	123	154	183	155	158	113	144	178	152	153
Average Time (s) / Mile	179	214	247	204	208	184	222	269	226	228
Average Distance (m) / Vehicle	1107	1160	1196	1222	1220	986	1045	1062	1079	1077
Average Speed (mph)	20	17	15	18	17	20	16	13	16	16
Average Speed (kph)	32	27	24	28	28	31	26	22	26	25
Average Delay / Vehicle	37	64	90	59	63	33	60	92	65	66

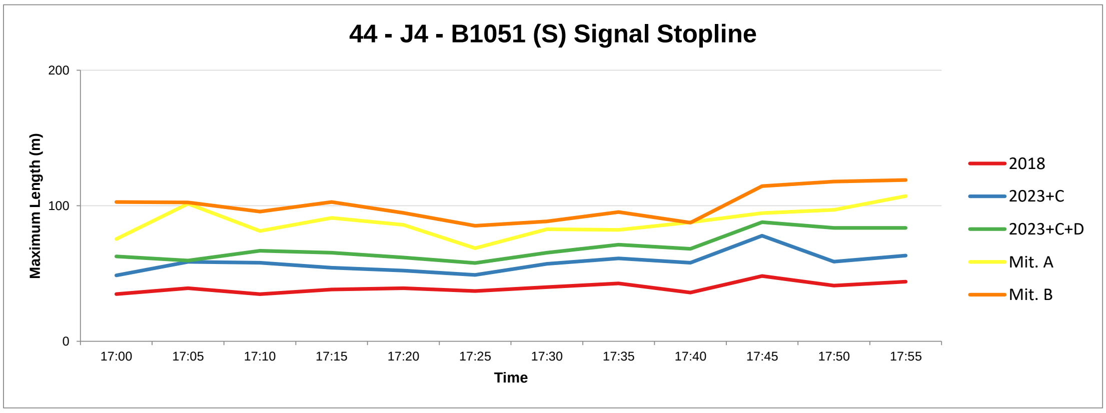


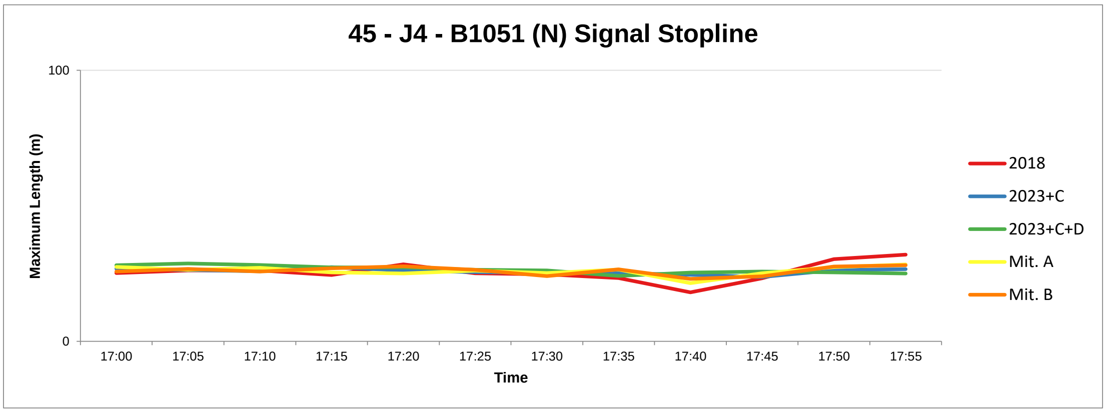


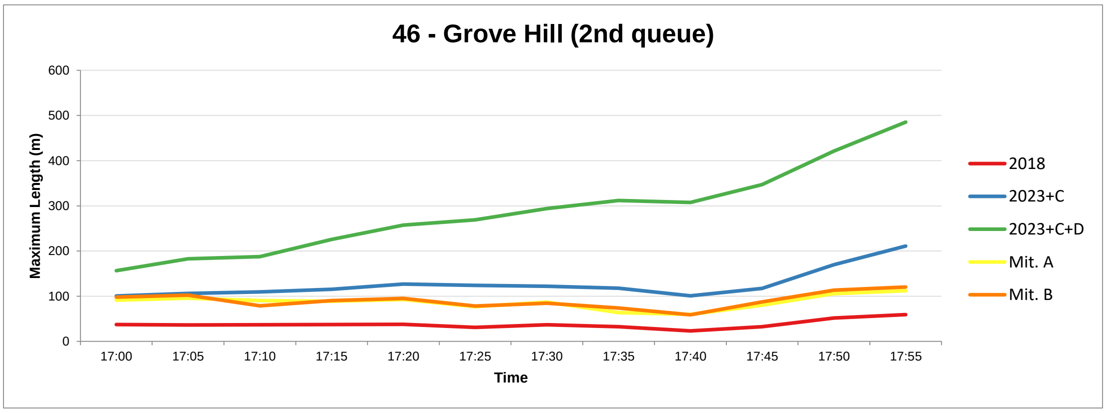

41 - J4 - Lower Street LT
Maximum Length (m)
100
0
17:00
17:05
17:10
17:15
17:20
17:25
17:30
17:35
17:40
17:45
17:50
17:55
Time
2018
2023+C
2023+C+D
Mit. A
Mit. B

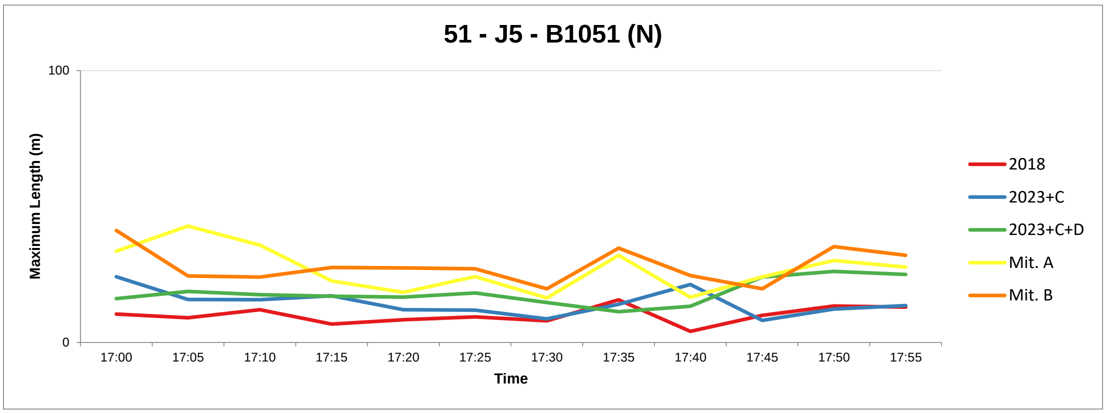

42 - J4 - Lower Street RT
Maximum Length (m)
100
0
17:00
17:05
17:10
17:15
17:20
17:25
17:30
17:35
17:40
17:45
17:50
17:55
Time
2018
2023+C
2023+C+D
Mit. A
Mit. B

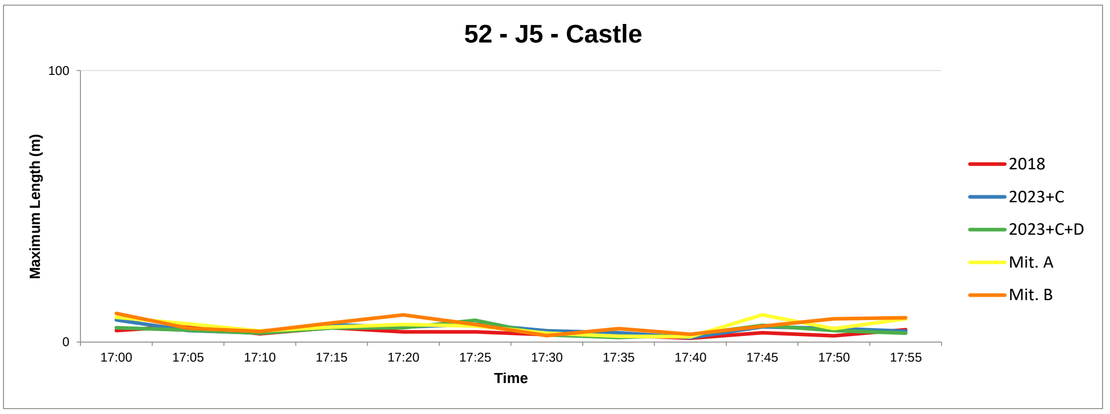

43 - J4 - B1051 (N) RT
Maximum Length (m)
100
0
17:00
17:05
17:10
17:15
17:20
17:25
17:30
17:35
17:40
17:45
17:50
17:55
Time
2018
2023+C
2023+C+D
Mit. A
Mit. B

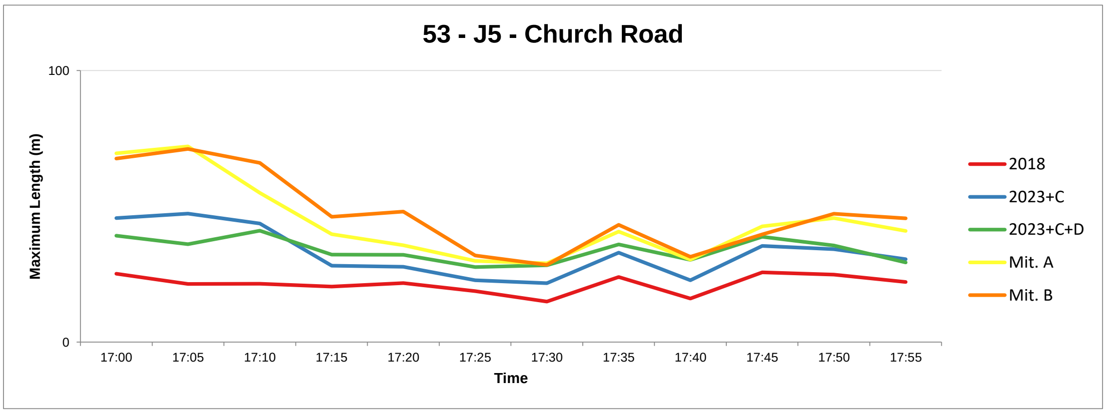

44 - J4 - B1051 (S) Signal Stopline
Maximum Length (m)
200
100
0
17:00
17:05
17:10
17:15
17:20
17:25
17:30
17:35
17:40
17:45
17:50
17:55
Time
2018
2023+C
2023+C+D
Mit. A
Mit. B

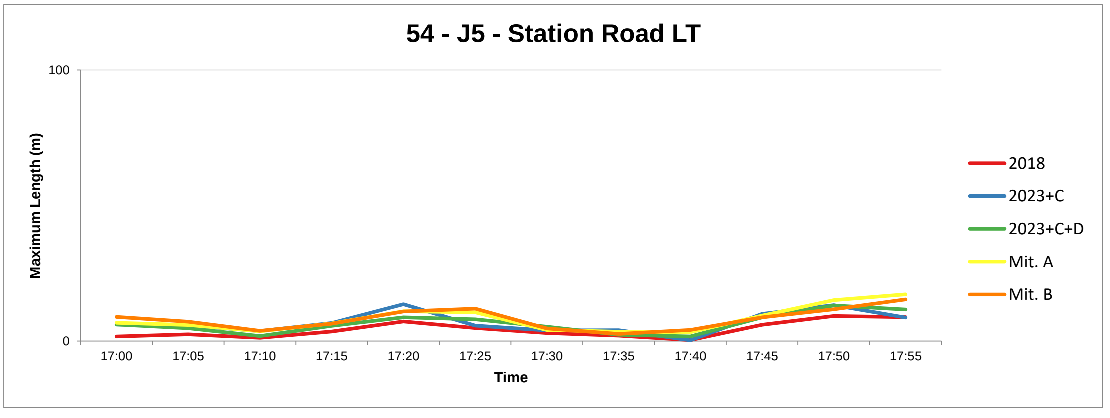

45 - J4 - B1051 (N) Signal Stopline
Maximum Length (m)
100
0
17:00
17:05
17:10
17:15
17:20
17:25
17:30
17:35
17:40
17:45
17:50
17:55
Time
2018
2023+C
2023+C+D
Mit. A
Mit. B

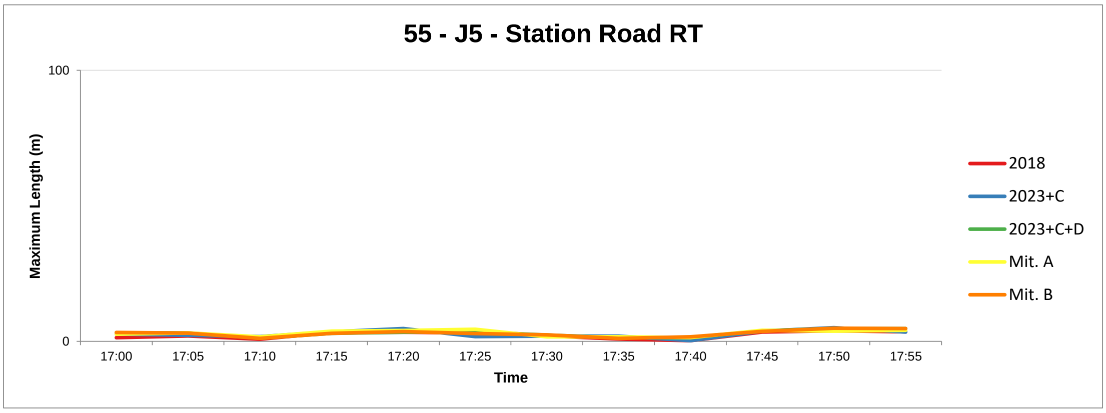

46 - Grove Hill (2nd queue)
Maximum Length (m)
600
500
400
300
200
100
0
17:00
17:05
17:10
17:15
17:20
17:25
17:30
17:35
17:40
17:45
17:50
17:55
Time
2018
2023+C
2023+C+D
Mit. A
Mit. B

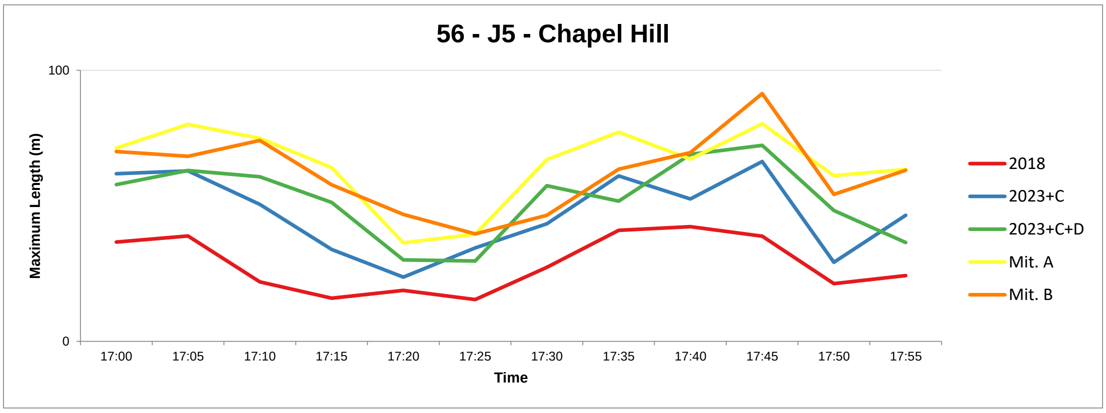

51 - J5 - B1051 (N)
Maximum Length (m)
100
0
17:00
17:05
17:10
17:15
17:20
17:25
17:30
17:35
17:40
17:45
17:50
17:55
Time
2018
2023+C
2023+C+D
Mit. A
Mit. B

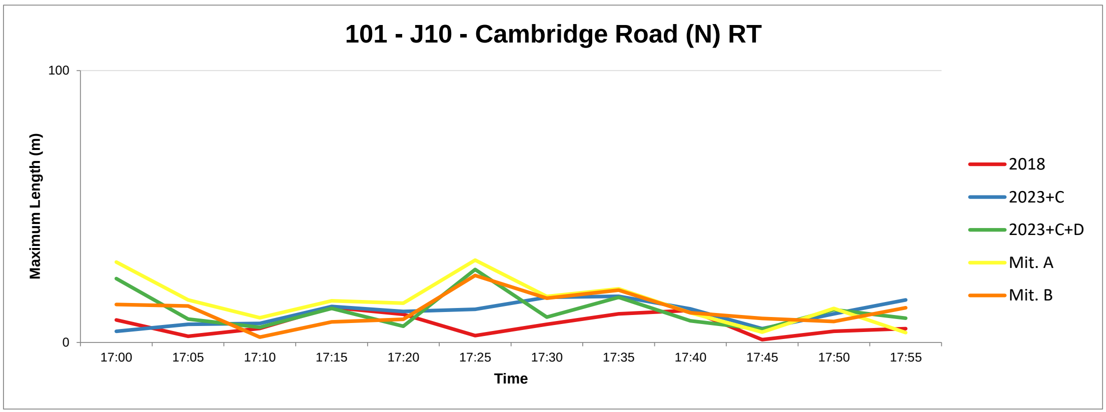

52 - J5 - Castle
Maximum Length (m)
100
0
17:00
17:05
17:10
17:15
17:20
17:25
17:30
17:35
17:40
17:45
17:50
17:55
Time
2018
2023+C
2023+C+D
Mit. A
Mit. B

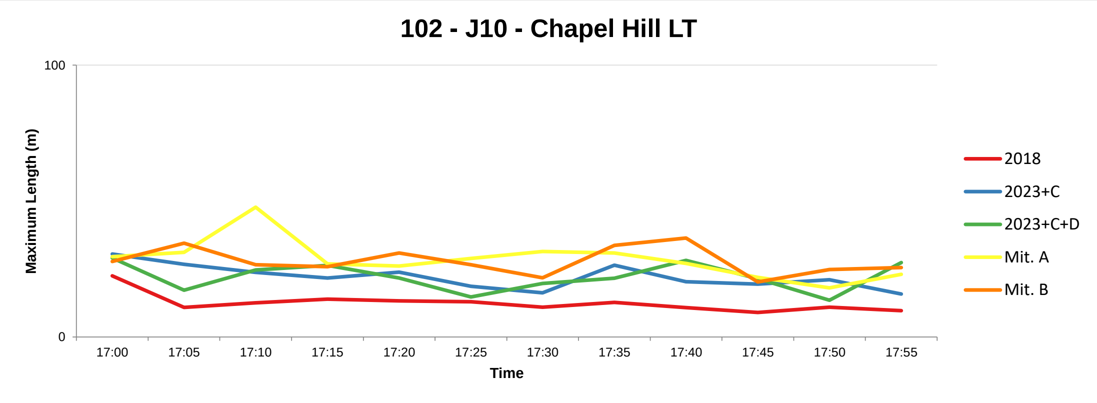

53 - J5 - Church Road
Maximum Length (m)
100
0
17:00
17:05
17:10
17:15
17:20
17:25
17:30
17:35
17:40
17:45
17:50
17:55
Time
2018
2023+C
2023+C+D
Mit. A
Mit. B

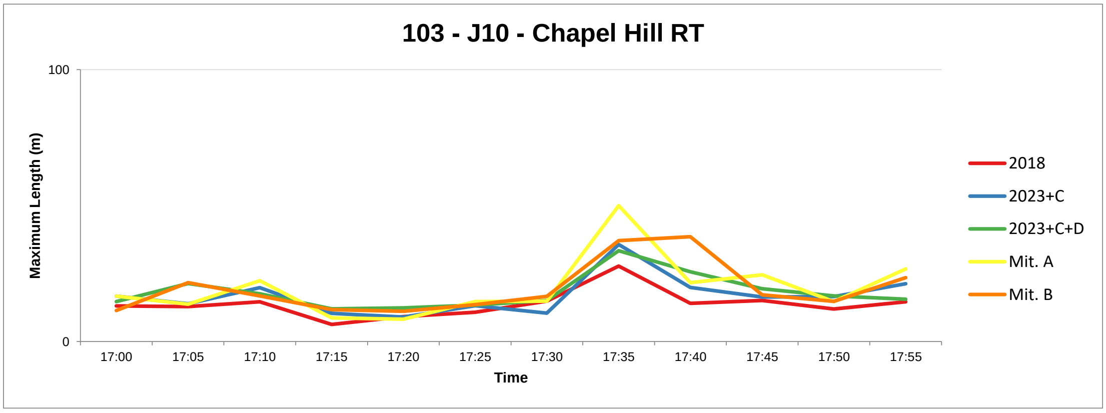

54 - J5 - Station Road LT
Maximum Length (m)
100
0
17:00
17:05
17:10
17:15
17:20
17:25
17:30
17:35
17:40
17:45
17:50
17:55
Time
2018
2023+C
2023+C+D
Mit. A
Mit. B

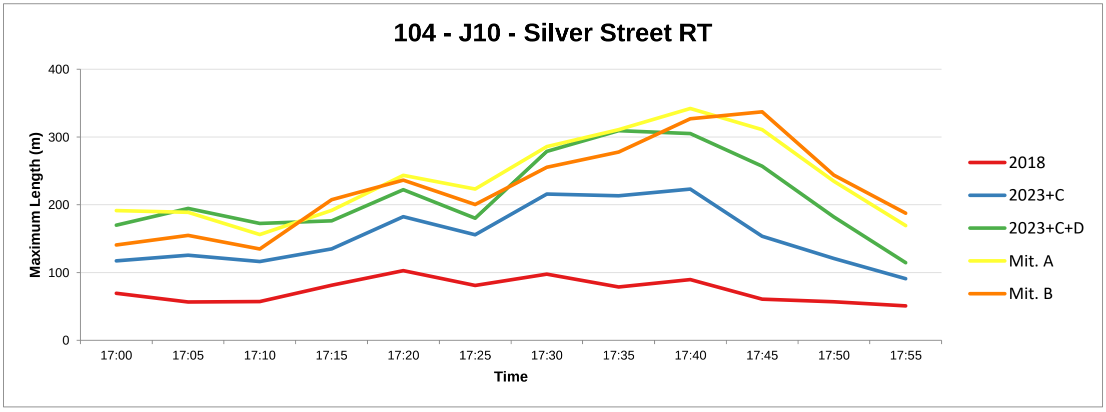

55 - J5 - Station Road RT
Maximum Length (m)
100
0
17:00
17:05
17:10
17:15
17:20
17:25
17:30
17:35
17:40
17:45
17:50
17:55
Time
2018
2023+C
2023+C+D
Mit. A
Mit. B

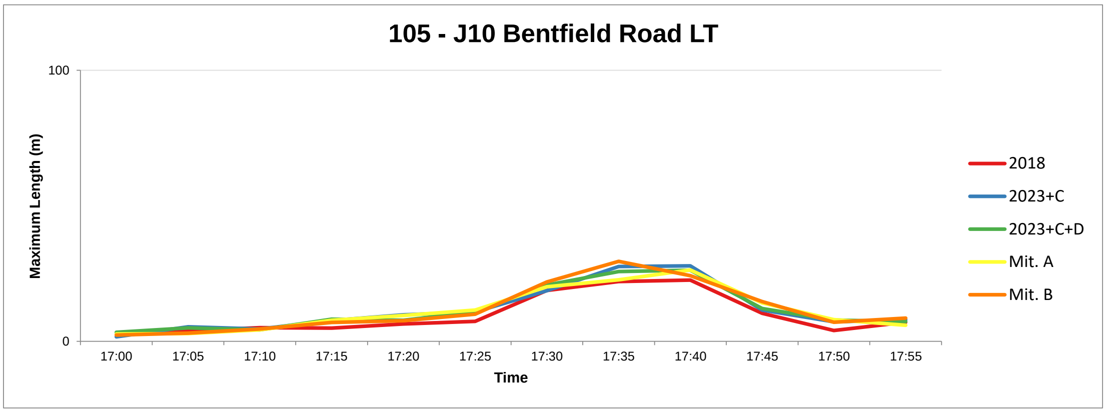

56 - J5 - Chapel Hill
Maximum Length (m)
100
0
17:00
17:05
17:10
17:15
17:20
17:25
17:30
17:35
17:40
17:45
17:50
17:55
Time
2018
2023+C
2023+C+D
Mit. A
Mit. B

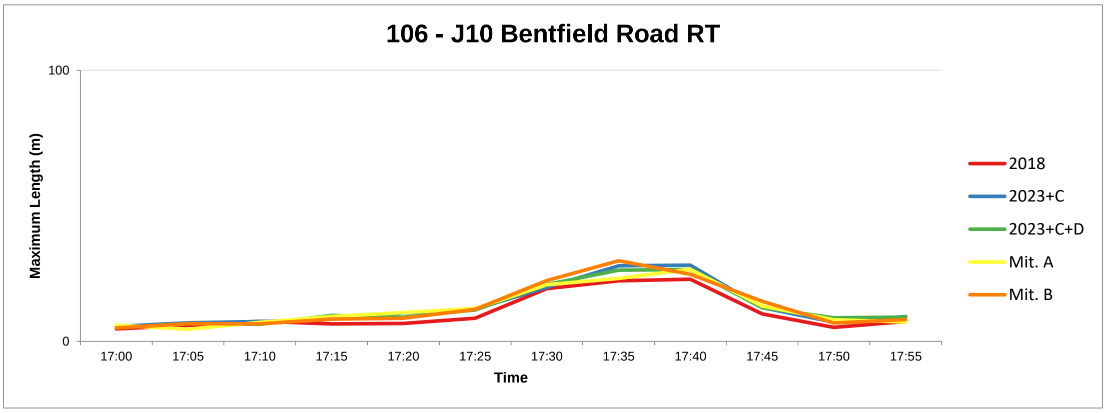

101 - J10 - Cambridge Road (N) RT
Maximum Length (m)
100
0
17:00
17:05
17:10
17:15
17:20
17:25
17:30
17:35
17:40
17:45
17:50
17:55
Time
2018
2023+C
2023+C+D
Mit. A
Mit. B

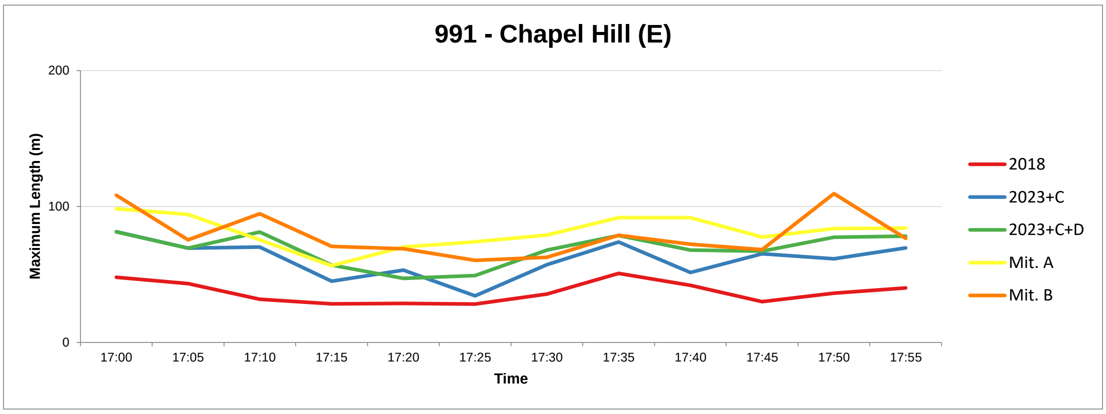

102 - J10 - Chapel Hill LT
Maximum Length (m)
100
0
17:00
17:05
17:10
17:15
17:20
17:25
17:30
17:35
17:40
17:45
17:50
17:55
Time
2018
2023+C
2023+C+D
Mit. A
Mit. B

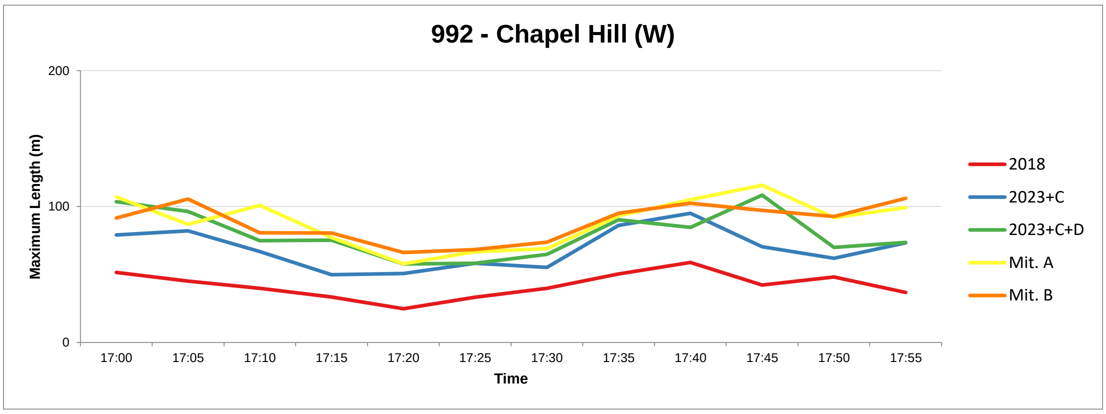

103 - J10 - Chapel Hill RT
Maximum Length (m)
100
0
17:00
17:05
17:10
17:15
17:20
17:25
17:30
17:35
17:40
17:45
17:50
17:55
Time
2018
2023+C
2023+C+D
Mit. A
Mit. B


104 - J10 - Silver Street RT
Maximum Length (m)
400
300
200
100
0
17:00
17:05
17:10
17:15
17:20
17:25
17:30
17:35
17:40
17:45
17:50
17:55
Time
2018
2023+C
2023+C+D
Mit. A
Mit. B


105 - J10 Bentfield Road LT
Maximum Length (m)
100
0
17:00
17:05
17:10
17:15
17:20
17:25
17:30
17:35
17:40
17:45
17:50
17:55
Time
2018
2023+C
2023+C+D
Mit. A
Mit. B


106 - J10 Bentfield Road RT
Maximum Length (m)
100
0
17:00
17:05
17:10
17:15
17:20
17:25
17:30
17:35
17:40
17:45
17:50
17:55
Time
2018
2023+C
2023+C+D
Mit. A
Mit. B


991 - Chapel Hill (E)
Maximum Length (m)
200
100
0
17:00
17:05
17:10
17:15
17:20
17:25
17:30
17:35
17:40
17:45
17:50
17:55
Time
2018
2023+C
2023+C+D
Mit. A
Mit. B


992 - Chapel Hill (W)
Maximum Length (m)
200
100
0
17:00
17:05
17:10
17:15
17:20
17:25
17:30
17:35
17:40
17:45
17:50
17:55
Time
2018
2023+C
2023+C+D
Mit. A
Mit. B

Queue Comparison
PM
Maximum Length Summary
Maximum Length (m)

	2018	2023+C	2023+C+D	Mit. A	Mit. B
41 - J4 - Lower Street LT	14.2	16.4	17.0	23.7	31.7
42 - J4 - Lower Street RT	18.9	18.7	19.5	26.8	34.1
43 - J4 - B1051 (N) RT	4.7	3.8	3.2	7.4	3.0
44 - J4 - B1051 (S) Signal Stoplin	48.2	77.9	87.9	107.1	119.0
45 - J4 - B1051 (N) Signal Stoplin	32.0	27.4	28.7	28.4	28.1
46 - Grove Hill (2nd queue)	59.1	210.9	485.3	112.0	120.3
51 - J5 - B1051 (N)	15.7	24.2	26.1	42.8	41.2
52 - J5 - Castle	5.9	8.2	8.0	10.0	10.6
53 - J5 - Church Road	25.7	47.3	41.0	72.1	71.1
54 - J5 - Station Road LT	9.2	13.6	13.1	17.2	15.4
55 - J5 - Station Road RT	3.9	5.0	4.7	4.5	4.8
56 - J5 - Chapel Hill	42.3	66.3	72.3	80.3	91.4
101 - J10 - Cambridge Road (N)	12.9	17.0	26.8	30.3	24.6
102 - J10 - Chapel Hill LT	22.5	30.5	29.1	47.7	36.4
103 - J10 - Chapel Hill RT	27.7	35.7	33.4	50.0	38.5
104 - J10 - Silver Street RT	102.8	223.1	309.3	342.1	337.2
105 - J10 Bentfield Road LT	22.6	27.8	26.2	26.3	29.5
106 - J10 Bentfield Road RT	22.9	28.1	26.5	26.6	29.7
991 - Chapel Hill (E)	50.8	81.5	81.3	98.4	109.5
992 - Chapel Hill (W)	58.9	95.0	108.4	115.7	106.1

Queue Comparison
PM
Average Length Summary
Maximum Length (m)

	2018	2023+C	2023+C+D	Mit. A	Mit. B
41 - J4 - Lower Street LT	9.0	12.5	12.3	15.3	18.4
42 - J4 - Lower Street RT	13.2	15.9	16.0	18.8	22.0
43 - J4 - B1051 (N) RT	2.1	1.7	1.3	2.0	1.2
44 - J4 - B1051 (S) Signal Stoplin	39.6	58.1	69.5	87.9	100.5
45 - J4 - B1051 (N) Signal Stoplin	25.6	25.8	26.5	26.0	26.0
46 - Grove Hill (2nd queue)	37.6	126.7	287.0	86.9	90.0
51 - J5 - B1051 (N)	10.0	14.6	18.2	27.1	28.2
52 - J5 - Castle	3.6	4.8	4.3	5.7	6.4
53 - J5 - Church Road	21.4	32.7	33.9	44.3	47.2
54 - J5 - Station Road LT	4.2	6.8	6.5	8.1	8.0
55 - J5 - Station Road RT	2.3	2.7	3.0	3.0	2.9
56 - J5 - Chapel Hill	28.6	47.2	52.3	65.2	62.1
101 - J10 - Cambridge Road (N)	6.7	11.0	11.9	15.1	12.2
102 - J10 - Chapel Hill LT	12.5	22.0	22.1	28.6	27.9
103 - J10 - Chapel Hill RT	13.8	16.9	18.1	19.7	19.5
104 - J10 - Silver Street RT	73.5	154.1	213.6	237.4	225.2
105 - J10 Bentfield Road LT	9.6	11.7	11.6	11.3	11.7
106 - J10 Bentfield Road RT	10.6	12.9	12.6	12.4	12.8
991 - Chapel Hill (E)	36.9	61.0	68.6	81.4	78.9
992 - Chapel Hill (W)	42.0	69.1	79.8	89.2	88.3

Journey Time Table
PM

Route Names	2018	2023+C	2023+C+D	Mit. A	Mit. B
101 - B1051 (SB): Farm to Lower	97	216	400	114	122
102 - B1051 (SB): Lower Rd turni	17	17	17	21	22
103 - B1051 (WB): Chapel Hill Rc	77	93	100	106	105
104 - Silver Street (SB): Crafton C	30	30	30	30	30
105 - Silver Street (NB): Blythwoc	45	58	67	71	68
106 - B1051 (EB): Crafton Green	68	82	84	92	93
107 - B1051 (NB): Chapel Hill Rd	25	29	29	35	38
108 - B1051 (NB): Lower Rd turni	41	42	42	42	43
200 - Elsenham to Stansted Mour	106	142	224	149	149

Appendix G

ACCESS JUNCTION RSA

ACORNS PROJECTS LIMITED

Henham Road, Elsenham, Essex

Proposed Section 278 Highway Works

Stage 1 Road Safety Audit

For WSP

Prepared by Acorns Projects Limited

Safety Traffic Project Management & Highway Engineering Consultants

SEPTEMBER 2018

Acorns Projects Limited
Safety Traffic Project Management & Highway Engineering Consultants
Redwood House
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[redacted]

Version No: 1.0

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Revision History

This document has the following history:

Version No.	Version Date	Summary of Changes	Changes marked
1.0	01/09/2018	N/A	N/A

Approvals

This document requires the following approvals:

Name	Title
Adriano B. Cappella	Audit Team Leader
David A. Bowie	Audit Team Member

Distribution

This document has also been distributed to:

Name	Title & Organisation
Matthew Ingrey	Associate Director - WSP
Gerry Corrance	Technical Director - WSP
Shane Luck	Engineer - WSP

[redacted]

1.0 INTRODUCTION

1.1 This report results from a Stage 1 Road Safety Audit carried out on the Landseer Road, Ipswich, Suffolk, Proposed Pedestrian Crossing Facilities Project, at the request of the Design Organisation, WSP, 62-64 Hills Road, Cambridge, Cambridgeshire, CB2 1LA. The Client Organisation is Fairfield (Elsenham) Limited, Chells Manor House, Chells Lane, Stevenage, Hertfordshire, SG2 7AA.

1.2 The scheme proposals comprise the construction of a new priority T-junction, new lengths of footway and proposed uncontrolled pedestrian crossing facilities on the northern and north western side of Henham Road, Elsenham, Essex, in order to serve a proposed residential development. In addition, new on-carriageway bus stop facilities will be provided on the north western and southern sides of the carriageway. The scheme proposals are associated with the construction of 350 new residential dwellings.

The overall scheme proposals include the following:

- Up to 350 new residential dwellings.
- A one form entry primary school including early years and childcare setting.
- Access from the B1051 Henham Road with associated street lighting and street furniture.
- Pedestrian, cycle and vehicle routes including streets, squares, lanes and footpaths together with associated street lighting and street furniture.
- Pedestrian and cycle link to Elsenham Station and potential pedestrian and cycle link to Hailes Wood.
- Vehicular and cycle parking.
- Provision and/or upgrade/diversion of services including water, sewerage, telecommunications, electricity and gas and service media, and apparatus.
- On-plot renewable energy measures including photo-voltaics, solar heating and ground source heat pumps.
- Associated ground works and boundary treatments including construction hoardings.

1.3 The Audit Team membership was as follows:

Adriano B. Cappella IEng, FIHE, MCIHT, MSoRSA, HA RSA Certificate of Competency
(Audit Team Leader) Director, Acorns Projects Limited

David A. Bowie BSc (Hons), MCIHT, HA RSA Certificate of Competency
(Audit Team Member) Associate Consultant, Acorns Projects Limited

1.4 The Audit took place at the Eaton Bray office of Acorns Projects Limited during August and September2018. The Audit was undertaken in accordance with the Audit Brief contained in the WSP E-Mail to Acorns Projects Limited dated the 1st August 2018. The Audit comprised an examination of the drawings and document/data sheets provided by WSP and, are listed in Annex A.

1.5 The drawings and document/data sheets consisted of a copy of the site location plan, the primary site access, refuse vehicle tracking, Henham Road mitigation, road traffic collision data and, the December 2017 WSP Land East of Elsenham - Transport Assessment. Copies of the drawings at both A3 and A4 size were provided for the Audit Team's use. Road traffic collision data, vehicular traffic flow data, pedestrian and pedal cycle accessibility information and, public transport information is contained within the December 2017 Transport Assessment.

1.6 A visit to the site was undertaken during the afternoon of the 6th August 2018 by both Audit Team Members together. During the afternoon site visit, the weather was hot and sunny and, the existing carriageway surface was dry. Vehicular traffic conditions at the time of the afternoon site visit were observed to be light to moderate. No pedestrian and one pedal cyclist were observed during the afternoon site visit.

1.7 The terms of reference of the Audit are as described in HD 19/15. The Audit Team has examined and reported only on the road safety implications of the scheme as presented and, has not examined or verified the compliance of the designs to any other criteria. However, to clearly explain a safety problem or the recommendation made to resolve the identified problem, the Audit Team may, on occasion, have referred to a Design Standard without touching on technical audit.

1.8 No Departures from Design Standards have been reported by the Design Organisation.

1.9 All Problems and Recommendations are referenced to the design drawings and the locations have been indicated on the A4 plan supplied for use by the Audit Team in Annex B.

1.10 Issues identified or observations made during this Stage 1 Road Safety Audit and site inspection which the Terms of Reference exclude from this report, but which the Audit Team wishes to draw to the attention of the Audit Project Sponsor, i.e. the Local Highway Authority, Essex County Council, will be set out in a separate letter. These issues could include maintenance items and operational issues. The Audit Team has not identified any issues during this Stage 1 Road Safety Audit and site inspection that are considered to be outside the Terms of Reference.

2.0 ITEMS RAISED AT THIS STAGE 1 ROAD SAFETY AUDIT

2.1 GENERAL

2.1.1 No Problems identified in this category at this Stage 1 Road Safety Audit.

2.2 LOCAL ALIGNMENT

2.2.1 PROBLEM

Locations 1 & 2 - The proposed on-carriageway bus stop facilities (Drawing No. 0582-GA-002E Rev E).

Summary - The presence of the on-carriageway bus stop facilities in proximity to the two proposed uncontrolled pedestrian crossing facilities could, when occupied, mask the presence of pedestrians seeking to cross the Henham Road carriageway, whereby there could be a potential increased risk of pedestrian/vehicular conflicts and subsequent pedestrian/vehicular collisions occurring.

The scheme proposals indicate that two on-carriageway bus stop facilities will be provided along the north western and southern sides of the Henham Road carriageway. In close proximity, it is proposed to install two new uncontrolled pedestrian crossing facilities either side of the proposed new priority T-junction for the residential development.

Concern arises that when the on-carriageway bus stops are occupied, the presence of stationary buses could mask or impact upon the intervisibility between approaching vehicles and pedestrians attempting to cross the Henham Road carriageway at the uncontrolled pedestrian crossing points. This could result in a potential increased risk of pedestrian/vehicular conflicts and subsequent pedestrian/vehicular collisions occurring, whereby pedestrians may sustain personal injury, particularly those pedestrians who may be blind or visually impaired.

RECOMMENDATION

It is Recommended that at the detailed design stage of the project, the proposed on-carriageway bus stop along the north western kerbline of Henham Road should be relocated and a new bus layby constructed within the adjacent verge area, which it is assumed will become highway verge in the future scenario order to ensure that the proposed visibility splay can be retained and protected from any potential obstructions accordingly.

In addition, it is Recommended that the on-carriageway bus stop along the southern kerbline of Henham Road should be resited to a point further to the west of its current proposed location.

The above Recommendations should ensure that pedestrians seeking to cross the Henham Road carriageway will be clearly seen by any approaching vehicles.

2.3 JUNCTIONS

2.3.1 PROBLEM

Locations 3, 4 & 5 - The new priority T-junction in Henham Road (Drawing No. 0582-GA-002E Rev E).

Summary - Proposed visibility splays for drivers when looking to the left and right is likely to be impacted upon in the future scenario by the presence of the embankments and existing mature trees and vegetation.

The scheme drawings indicate that visibility splays of 4.5 x 120 metres when looking to the left and right will be provided for vehicles exiting the proposed residential development site priority T-junction, as indicated at Location 3. The site visit has established the presence of embankments, mature trees and vegetation along the north western side of Henham Road, as indicated as Locations 4 and 5.

Whilst it could be assumed that everything within the visibility splay area identified in blue on the scheme drawing will be cleared at the construction stage of the project, the Audit Team believe it will be very important that no visual obstructions should remain or be placed within the visibility splay area in the future scenario, particularly as the proposed priority T-junction will be sited on the inside of the bend on the Henham Road carriageway.

Concern arises that the combination of factors described above could result in a potential increased risk that vehicular conflicts and subsequent side impact vehicular collisions could occur between vehicular traffic exiting the proposed residential development site priority t-junction and, Henham Road vehicles, particularly if the existing 40 mph speed limit should remain in the future scenario, whereby the visibility splays of 4.5 x 120 metres would be considered an absolute necessity in terms of operational road safety.

RECOMMENDATION

It is Recommended that the levels of the proposed visibility splay area identified in blue should not exceed the levels of the Henham Road kerblines and, that the proposed visibility splay area when looking both to the right and to the left should be kept clear of any potential obstructions.

2.4 NON MOTORISED USER PROVISION

2.4.1 PROBLEM

Locations 6 & 7 - The proposed new priority T-junction serving the proposed residential development (Drawing No. 0582-GA-002E Rev E).

Summary - Accommodating an anticipated pedestrian desire line across the proposed new priority T-junction.

The scheme drawing indicates that a proposed new priority T-junction will be constructed in order to serve the proposed residential development site. At this Stage 1 Road Safety Audit, the scheme proposals do not indicate how the future anticipated pedestrian desire line across the proposed new priority T-junction will be accommodated in the future scenario.

Concern arises that a lack of dropped kerbs and tactile paving at the proposed new priority T-junction could result in a slight detriment to operational safety for pedestrians in the future scenario, whereby there could be an increased risk of trips and falls occurring. This could result in pedestrians sustaining personal injury, particularly those pedestrians who may be blind or visually impaired.

RECOMMENDATION

It is Recommended that in order to accommodate the anticipated pedestrian desire line across the proposed new priority T-junction, particularly for blind or visually impaired pedestrians, dropped kerbs and tactile paving should be provided at the detailed design stage of the project.

2.5 ROAD SIGNS, CARRIAGEWAY MARKINGS & STREET LIGHTING

2.5.1 PROBLEM

Locations - General, within the length of the proposed Section 278 highway works (Drawing No. 0582-GA-002E Rev E).

Summary - Enhancing the conspicuity of the proposed Section 278 Highway Works during the hours of darkness.

Street Lighting improvement proposals have not been submitted for this Stage 1 Road Safety Audit. Concern arises that a new/modified system of street lighting will need to be provided to suit the proposed Section 278 Highway Works during the hours of darkness, particularly as the scheme proposals include a new priority T-junction, two new bus stops and the two uncontrolled pedestrian crossing facilities.

A lack of street lighting could result in a potential increased risk of right and left turning side impact collisions occurring, or nose to tail shunt type vehicular collisions occurring during the hours of darkness between a leading and any following vehicles seeking to enter the new priority T-junction.

In addition, and equally important, the lack of street lighting could result in a potential increased risk of pedestrian/vehicular conflicts and subsequent pedestrian/vehicular collisions occurring at the two uncontrolled pedestrian crossing points during the hours of darkness, whereby pedestrians could potentially sustain high levels of personal injury.

RECOMMENDATION

It is Recommended that a new/modified system of street lighting should be provided for the length and overall area of the proposed Section 278 highway works, thus enhancing the operational safety of the overall scheme proposals during the hours of darkness. The provision of street lighting should include the proposed extension of the 30 mph speed limit, which will assist drivers to recognise and acknowledge the change in environment upon entry to the extended Elsenham urban area.

END OF PROBLEMS IDENTIFIED AND RECOMMENDATIONS OFFERED IN THIS STAGE 1 ROAD SAFETY AUDIT

3.0 AUDIT TEAM STATEMENT

We certify that this Audit has been carried out in accordance with HD 19/15.

AUDIT TEAM LEADER

Adriano B. Cappella IEng, FIHE, MCIHT, MSoRSA, HA RSA Certificate of Competency
Director
Acorns Projects Limited
Safety Traffic Project Management & Highway Engineering Consultants
Redwood House
3 Eaton Park
Eaton Bray
Bedfordshire
LU6 2SP

Signed : [redacted]

Date : 16th November 2018

AUDIT TEAM MEMBER

David A. Bowie BSc (Hons), MCIHT, HA RSA Certificate of Competency
Associate Consultant
Acorns Projects Limited
Safety Traffic Project Management & Highway Engineering Consultants
Redwood House
3 Eaton Park
Eaton Bray
Bedfordshire
LU6 2SP

Signed : [redacted]

Date : 16th November 2018

ANNEX A

ANNEX A

HENHAM ROAD, ELSENHAM, ESSEX

PROPOSED SECTION 278 HIGHWAY WORKS

STAGE 1 ROAD SAFETY AUDIT

LIST OF WSP DRAWINGS SUBMITTED FOR AUDITING

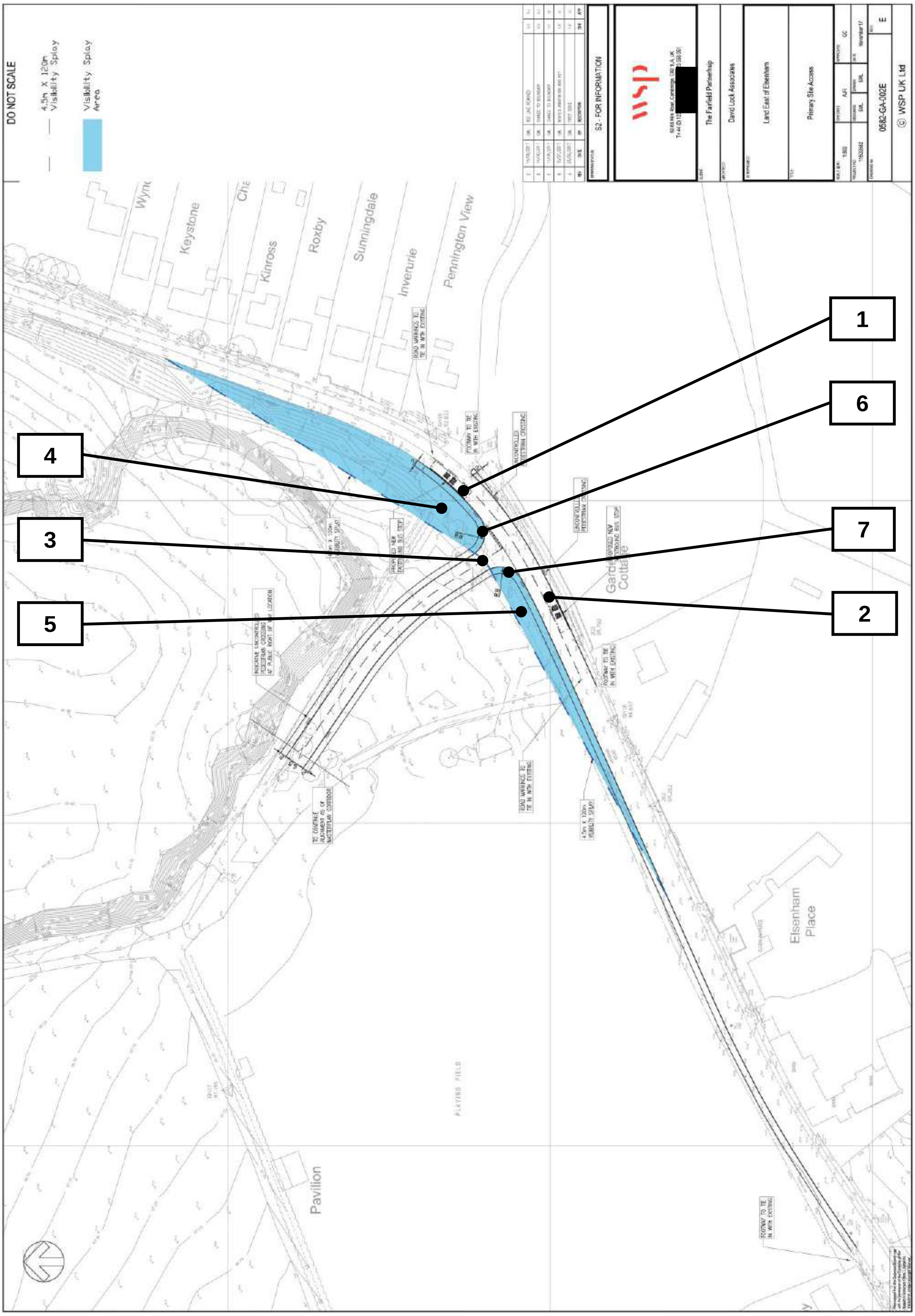
DRAWING NO.	**TITLE**
Appendix A	Site Location Plan
0582-GA-002E Rev E	Primary Site Access
0582-ATR-001B Rev B	Refuse Vehicle Tracking
0582-SK-003B Rev B	Henham Road Mitigation

LIST OF DOCUMENT/DATA SHEETS REVIEWED AT THIS STAGE 1 ROAD SAFETY AUDIT

WSP - Land East of Elsenham - Transport Assessment - December 2017
Essex County Council - Personal Injury Collision Location Plan - 60 months collision data between 1st May 2013 and 30th April 2018
Essex County Council - Interpreted Listing - 60 months collision data between 1st May 2013 and 30th April 2018

ANNEX B

ANNEX B - PROBLEM LOCATION PLAN



DESIGNERS' RESPONSE TO ACORN PROJECTS LTD STAGE 1 ROAD SAFETY AUDIT
LAND EAST OF ELSENHAM, ESSEX

OCTOBER 2018

INTRODUCTION

This Designers' Response has been prepared to address the Acorn Projects Ltd (APL) Stage 1 Safety Audit dated September 2018 of proposed access arrangements for residential development on land east of Elsenham.

The access arrangements comprise a new priority T-junction on Henham Road, and form part of the outline planning application for Fairfield (Elsenham) Ltd's proposed development comprising 3500 new dwellings. The Uttlesford District Council application reference is UTT/17/3573/OP.

The APL Stage 1 Safety Audit reviewed WSP drawing 0582/GA/002 Rev E.

A Transport Assessment was submitted with the planning application, which includes junction modelling of the proposed access arrangements.

The response accepts a number of the recommendations of the Stage 1 Safety Audit, and this is has resulted in design changes to the proposed arrangements. The resulting access arrangements are shown on WSP drawing 0582/GA/002 Rev F.

2.2 – LOCAL ALIGNMENT

APL Item 2.2.1
Location:
The proposed on-carriageway bus stop facilities.

CCC Summary of Problem:
The presence of the on-carriageway bus stop facilities in proximity to the two proposed uncontrolled pedestrian crossing facilities could, when occupied, mask the presence of pedestrians seeking to cross the Henham Road carriageway, whereby there could be a potential increased risk of pedestrian/vehicular conflicts and subsequent pedestrian/vehicular collisions occurring.

The scheme proposals indicate that two on-carriageway bus stop facilities will be provided along the north western and southern sides of the Henham Road carriageway. In close proximity, it is proposed to install two new uncontrolled pedestrian crossing facilities either side of the proposed new priority T-junction for the residential development.

Concern arises that when the on-carriageway bus stops are occupied, the presence of stationary buses could mask or impact upon the intervisibility between approaching vehicles and pedestrians attempting to cross the Henham Road carriageway at the uncontrolled pedestrian crossing points. This could result in a potential increased risk of pedestrian/vehicular conflicts and subsequent pedestrian/vehicular collisions occurring, whereby pedestrians may sustain personal injury, particularly those pedestrians who may be blind or visually impaired.

APL Recommendation:
It is recommended that at the detailed design stage of the project, the proposed on-carriageway bus stop along the north western kerbline of Henham Road should be relocated and a new bus layby constructed within the adjacent verge area, which it is assumed will become highway verge in the future scenario order to ensure that the proposed visibility splay can be retained and protected from any potential obstructions accordingly.

WSP Response to APL Item 2.2.1
Accepted:
Yes.

Action:
The proposed bus stops have been relocated to the west so that they are outside the visibility splay. The proposed location is shown on the revised access drawing 0582/GA/002 Rev F.

2.3 – THE JUNCTIONS

APL Item 2.3.1
Location:
The new priority T-junction in Henham Road.

APL Summary of Problem:
Proposed visibility splays for drivers when looking to the left and right is likely to be impacted upon in the future scenario by the presence of the embankments and existing mature trees and vegetation.

The scheme drawings indicate that visibility splays of 4.5 x 120 metres when looking to the left and right will be provided for vehicles exiting the proposed residential development site priority T-junction. The site visit has established the presence of embankments, mature trees and vegetation along the north western side of Henham Road.

Whilst it could be assumed that everything within the visibility splay area identified in blue on the scheme drawing will be cleared at the construction stage of the project, the Audit Team believe it will be very important that no visual obstructions should remain or be placed within the visibility splay area in the future scenario, particularly as the proposed priority T-junction will be sited on the inside of the bend on the Henham Road carriageway.

Concern arises that the combination of factors described above could result in a potential increased risk that vehicular conflicts and subsequent side impact vehicular collisions could occur between vehicular traffic exiting the proposed residential development site priority T-junction and Henham Road vehicles, particularly if the existing 40 mph speed limit should remain in the future scenario, whereby the visibility splays of 4.5 x 120 metres would be considered an absolute necessity in terms of operational road safety.

APL Recommendation:
It is recommended that the levels of the proposed visibility splay area identified in blue should not exceed the levels of the Henham Road kerb lines and, that the proposed visibility splay area when looking both to the right and to the left should be kept clear of any potential obstructions.

WSP Response to APL Item 2.3.1
Accepted:
Yes.

Action:
The junction visibility splay of 4.5m by 120m will be in accordance with DMRB Volume 6 Section 1 Part 1 TD 9/93 'Highway Link Design' paragraph 2.2, i.e. intervisibility will be available from a minimum driver's eye height of between 1.05m and 2.00m to an object of between 0.26m and 2.00m both above the road surface. The visibility splay will be within the adopted public highway, within which cutting back of vegetation will be a function of routine maintenance undertaken by Essex County Council.

2.4 – NON-MOTORISED USER PROVISION

APL Item 2.4.1
Location:
The proposed new priority T-junction serving the proposed residential development.

APL Summary of Problem:
Accommodating an anticipated pedestrian desire line across the proposed new priority T-junction.

The scheme drawing indicates that a proposed new priority T-junction will be constructed in order to serve the proposed residential development site. At this Stage 1 Road Safety Audit, the scheme proposals do not indicate how the future anticipated pedestrian desire line across the proposed new priority T-junction will be accommodated in the future scenario.

Concern arises that a lack of dropped kerbs and tactile paving at the proposed new priority T-junction could result in a slight detriment to operational safety for pedestrians in the future scenario, whereby there could be an increased risk of trips and falls occurring. This could result in pedestrians sustaining personal injury, particularly those pedestrians who may be blind or visually impaired.

APL Recommendation:
It is recommended that in order to accommodate the anticipated pedestrian desire line across the proposed new priority T-junction, particularly for blind or visually impaired pedestrians, dropped kerbs and tactile paving should be provided at the detailed design stage of the project.

WSP Response to APL Item 2.4.1
Accepted:
Yes.

Action:
Dropped kerbs and tactile paving are shown on the revised site access drawing 0582/GA/002 Rev F and will be provided at the detailed design stage of the project.

2.5 – ROAD SIGNS, CARRIAGEWAY MARKINGS AND STREET LIGHTING

APL Item 2.5.1
Location:
General, within the length of the proposed highway works.

APL Summary of Problem:
Enhancing the conspicuity of the proposed Highway Works during the hours of darkness.

Street Lighting improvement proposals have not been submitted for this Stage 1 Road Safety Audit. Concern arises that a new/modified system of street lighting will need to be provided to suit the proposed Highway Works during the hours of darkness, particularly as the scheme proposals include a new priority T-junction, two new bus stops and the two uncontrolled pedestrian crossing facilities.

A lack of street lighting could result in a potential increased risk of right and left turning side impact collisions occurring, or nose to tail shunt type vehicular collisions occurring during the hours of darkness between a leading and any following vehicles seeking to enter the new priority T-junction.

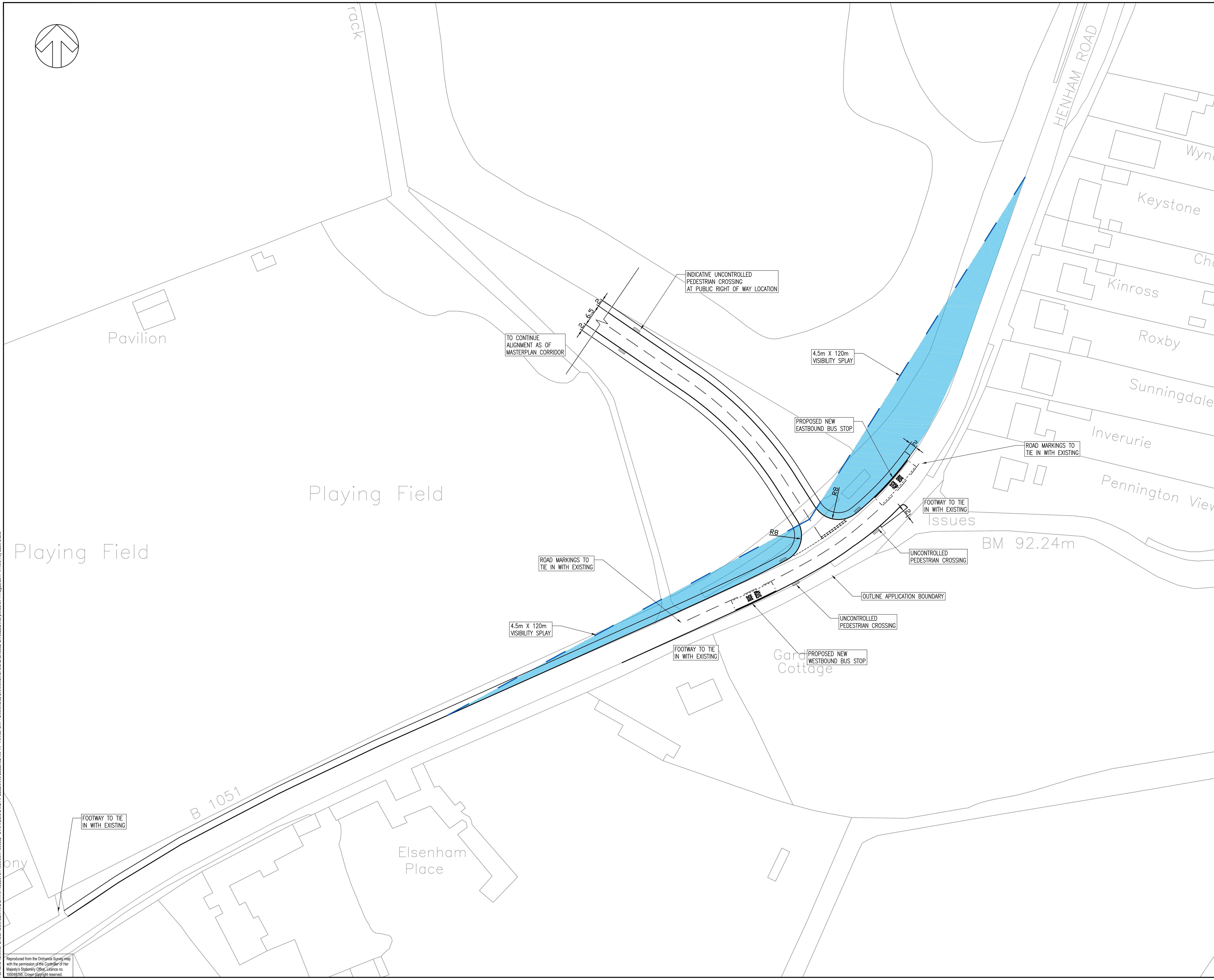
In addition, and equally important, the lack of street lighting could result in a potential increased risk of pedestrian/vehicular conflicts and subsequent pedestrian/vehicular collisions occurring at the two uncontrolled pedestrian crossing points during the hours of darkness, whereby pedestrians could potentially sustain high levels of personal injury.

APL Recommendation:
It is recommended that a new/modified system of street lighting should be provided for the length and overall area of the proposed highway works, thus enhancing the operational safety of the overall scheme proposals during the hours of darkness. The provision of street lighting should include the proposed extension of the 30 mph speed limit, which will assist

drivers to recognise and acknowledge the change in environment upon entry to the extended Elsenham urban area.

WSP Response to APL Item 2.5.1
Accepted:
Yes.

Action:
Street lighting will be part of the detailed design stage.



DO NOT SCALE

4.5m X 120m Visibility Splay

Visibility Splay Area

REV	DATE	BY	DESCRIPTION	CHK	APP
E	14/08/2017	SML	RED LINE REMOVED	MJI	MJI
D	14/08/2017	SML	CHANGE TO BOUNDARY	MJI	MJI
C	11/08/2017	SML	CHANGE TO BOUNDARY	ND	ND
B	10/07/2017	SML	REVISED ANNOTATION AND KEY	AJR	GC
A	25/05/2017	SML	FIRST ISSUE	AJR	GC

DRAWING STATUS: S2 - FOR INFORMATION

wsp

62-64 Hills Road, Cambridge, CB2 1LA, UK
T+ 44 (0) 1223 558 050, F+ 44 (0) 1223 558 051
[redacted]

CLIENT: The Fairfield Partnerhsip

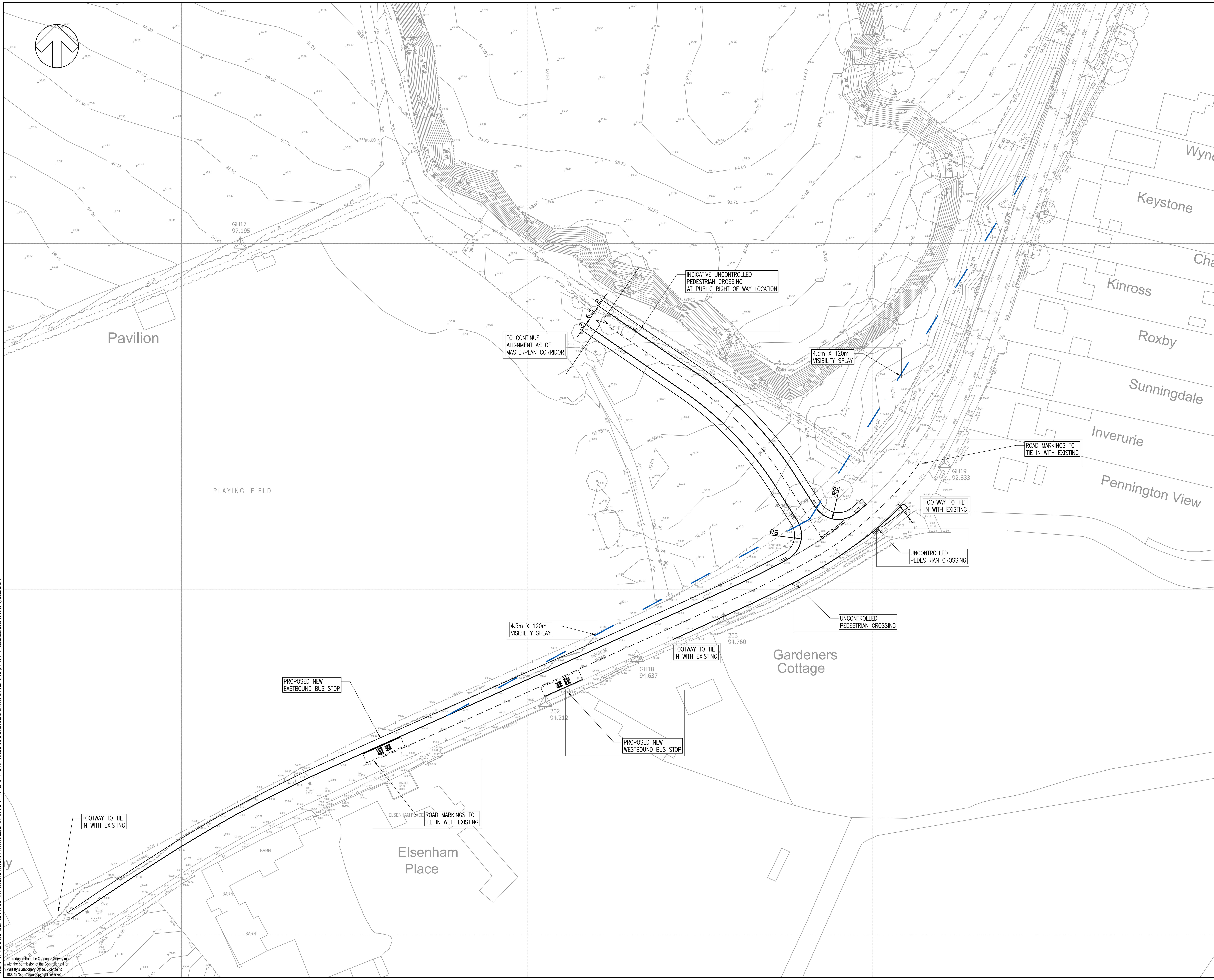
ARCHITECT: David Lock Associates

SITE/PROJECT: Land East of Elsenham

TITLE: Primary Site Access

SCALE @ A1: 1:500	CHECKED: AJR		APPROVED: GC
PROJECT NO: 11500582	DESIGNED: SML	DRAWN: SML	DATE: August 17

DRAWING No: 0582-GA-002E | REV: E



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File name \\UK.WSPGROUP.COM\CENTRAL DATA\PROJECTS\11500XXX\11500582 ELSENHAM\02 WIP\TP TRANSPORT PLANNING\02 DRAWING\AUTOCAD\GA\0582-GA-002F.DWG, printed on 17 September 2018 16:31:15, by Luck, Shane

DO NOT SCALE

4.5m X 120m Visibility Splay

Visibility Splay Area

REV	DATE	BY	DESCRIPTION	CHK	APP
F	17/09/2017	SML	STAGE 1 RSA COMMENTS ADDRESSED	MJI	MJI
E	14/08/2017	SML	RED LINE REMOVED	MJI	MJI
D	14/08/2017	SML	CHANGE TO BOUNDARY	MJI	MJI
C	11/08/2017	SML	CHANGE TO BOUNDARY	NP	NP
B	10/07/2017	SML	REVISED ANNOTATION AND KEY	AJF	GC
A	25/05/2017	SML	FIRST ISSUE	AJF	GC

DRAWING STATUS: S2 - FOR INFORMATION

wsp

62-64 Hills Road, Cambridge, CB2 1LA, UK
T+ 44 (0) 1223 558 050, F+ 44 (0) 1223 558 051
[redacted]

CLIENT: The Fairfield Partnerhsip

ARCHITECT: David Lock Associates

SITE/PROJECT: Land East of Elsenham

TITLE: Primary Site Access

SCALE @ A1: 1:500	CHECKED: MJI		APPROVED: MJI
PROJECT NO: 11500582	DESIGNED: SML	DRAWN: SML	DATE: November 17

DRAWING No: 0582-GA-002F

REV: F

Appendix H

ACCIDENTS ON HALL ROAD BRIEFING PAPER

LAND EAST OF ELSENHAM

ROAD TRAFFIC ACCIDENTS ON HALL ROAD

1. Traffic Accidents on Hall Road: May 2013 to April 2018

1.1 The transport assessment report prepared to support the planning application for 350 dwellings at Elsenham includes a description of road traffic accidents on the local highway network.

1.2 At a meeting with ECC highways officers in March 2018, WSP were requested to update the accident record information for Hall Road. The reason behind that request was that a fatal accident had occurred on Hall Road since the transport assessment had been submitted.

1.3 This paper provides an overview of the accident record information for Hall Road which was obtained from ECC subsequent to the March 2018 meeting.

1.4 Road traffic accident data for the 5-year period May 2013 to April 2018 has been obtained from ECC for Hall Road The accident data and plot is attached to this briefing paper. The data has been analysed to establish if there are any clusters or patterns in the types of collisions that have occurred.

1.5 There were 17 no. accidents recorded along Hall Road between the Henham Road priority junction in the north and the three-arm mini-roundabout junction with Parsonage Road/ Stansted Airport in the south during the review period. Of these, 15 no. were of slight injury severity and 1 no. was of serious injury severity There was 1 no. fatal accident. The data is analysed below.

Section of Hall Road Between Henham Road and Molehill Green Road

1.6 Of the accidents recorded, there were 2 no. slight injury accidents on Hall Road between its junctions with Henham Road and Molehill Green Road. The contributory factors for these accidents are summarised in Table 1 below.

Category of Accident Recorded on Hall Road Between Henham Road & Molehill Green Road	Factor	No. of Times Factor Recorded
Driver / Rider Error or Reaction	Loss of control	1
	Sub-total	*1*
Behaviour / Experience	Careless / reckless / in a hurry	1
	Sub-total	*1*
Road Environment	Slippery road (due to weather)	1
	Animal or object in carriageway	1
	Sub-total	*2*
	TOTAL	*4*

Table 1: Contributory Factors for Accidents Recorded on Hall Road Between Henham Road and Molehill Green Road

1.7 Based on this data, it is considered that there is not a road safety concern with the section of Hall Road between Henham Road and Molehill Green Road, and that the road layout itself is not a contributory factor for the accidents recorded.

Hall Road at its Junction with Molehill Green Road

1.8 There were 4 no. slight injury and 1 no. serious injury accidents on Hall Road in the immediate vicinity of its junction with Molehill Green Road. The contributory factors for these accidents are summarised in Table 2 below.

Category of Accident Recorded on Hall Road at Junction with Molehill Green Road	**Factor**	**No. of Times Factor Recorded**
Driver / Rider Error or Reaction	Failed to look properly	2
	Loss of control	1
	Misjudged other person's path or speed	1
	Sudden braking	1
	Sub-total	*5*
Injudicious Action	Following too close	1
	Sub-total	*1*
Behaviour / Experience	Careless / reckless / in a hurry	1
	Sub-total	*1*
Road Environment	Slippery road (due to weather)	1
	Sub-total	*1*
Vision Affected By	Dazzling headlights	1
	Dazzling sun	1
	Sub-total	*2*
	TOTAL	*10*

Table 2: Contributory Factors for Accidents Recorded on Hall Road at Junction with Molehill Green Road

1.9 The above summary indicates that actions by road users are the primary cause of the accidents recorded on Hall Road in the immediate vicinity of its junction with Molehill Green Road. Based on this data, it is considered that there is not a road safety concern with the section of Hall Road at its junction Molehill Green Road, and that the road layout itself is not a contributory factor for the accidents recorded.

Hall Road Between Molehill Green Road and Parsonage Road

1.10 There were 9 no. slight injury accidents and 1 no. fatal accidents on Hall Road between its junction with Molehill Green Road and Parsonage Road. The contributory factors for these accidents are summarised in Table 3 below.

Category of Accident Recorded on Hall Road Between Its Junctions with Molehill Green Road and Parsonage Road	**Factor**	**No. of Times Factor Recorded**
Driver / Rider Error or Reaction	Failed to look properly	2
	Loss of control	3
	Poor turn or manoeuvre	2
	Sub-total	*7*
Impairment or distraction	Fatigue	2
	Distraction in vehicle	1
	Sub-total	*3*
Behaviour / Experience	Careless / reckless / in a hurry	2
	Inexperience left-hand driving	1
	Sub-total	*3*
Road Environment	Slippery road (due to weather)	1
	Animal or object in carriageway	1
	Sub-total	*2*
Pedestrian Only Factors	Pedestrian wearing dark clothing at night	1
	Sub-total	*1*
	TOTAL	*16*

Table 3: Contributory Factors for Accidents Recorded on Hall Road Between Its Junction with Molehill Green Road and Parsonage Road

1.11 The above summary indicates that actions by road users are the primary cause of the accidents recorded on Hall Road between its junctions with Molehill Green Road and Parsonage Road, rather than the road layout itself. Based on this data, it is considered that there is not a road safety concern with the section of Hall Road between its junctions with Molehill Green Road and Parsonage Road.

1.12 The fatal accident recorded on this section of Hall Road occurred in darkness early in the morning, when a pedestrian walking along Hall Road towards Stansted Airport was struck from behind by a light van travelling in the same direction. The single contributory factor recorded by the Police was “Pedestrian wearing dark clothing at night”.

Hall Road: entire length between Henham Road and Parsonage Road

1.13 The overall accident record and associated contributory factors recorded on Hall Road for its entire length between Henham Road and Parsonage Road is summarised in Table 4 below.

Category of Accident Recorded on Hall Road Between Its Junctions with Henham Road and Parsonage Road	Factor	No. of Times Factor Recorded
Driver / Rider Error or Reaction	Failed to look properly	4
	Loss of control	5
	Poor turn or manoeuvre	2
	Misjudged other person's path or speed	1
	Sudden braking	1
	Sub-total	*13*
Injudicious Action	Following too close	1
	Sub-total	*1*
Impairment or distraction	Fatigue	2
	Distraction in vehicle	1
	Sub-total	*3*
Behaviour / Experience	Careless / reckless / in a hurry	4
	Inexperience left-hand driving	1
	Sub-total	*5*
Road Environment	Slippery road (due to weather)	3
	Animal or object in carriageway	2
	Sub-total	*5*
Vision Affected By	Dazzling headlights	1
	Dazzling sun	1
	Sub-total	*2*
Pedestrian Only Factors	Pedestrian wearing dark clothing at night	1
	Sub-total	*1*
	TOTAL	*30*

Table 4: Contributory Factors for Accidents Recorded on Hall Road Between Its Junctions with Henham Road and Parsonage Road

Conclusion

1.14 The above summary indicates that actions by road users are the primary cause of the accidents recorded on Hall Road between its junctions with Henham Road and Parsonage Road. Road layout is not cited as a contributory factor in any of the accidents recorded. It is therefore considered that the proposed development will not make the road any less safe and as such will have an insignificant impact with respect to road safety.

62-64 Hills Road
Cambridge
CB2 1LA

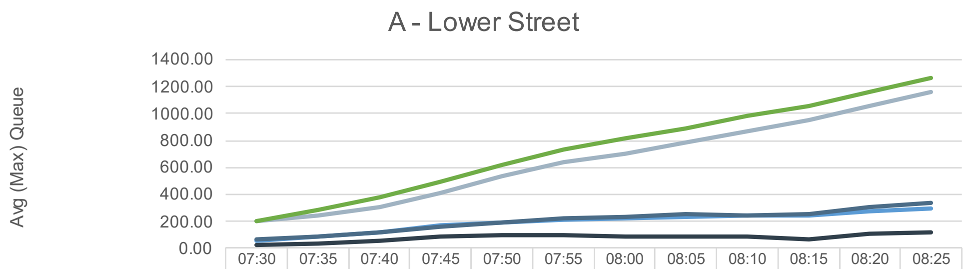
[redacted]

PUBLIC

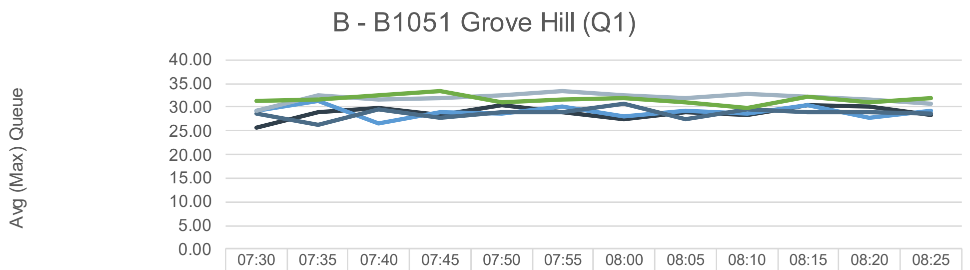
APPENDIX D:

QUEUE COMPARISON

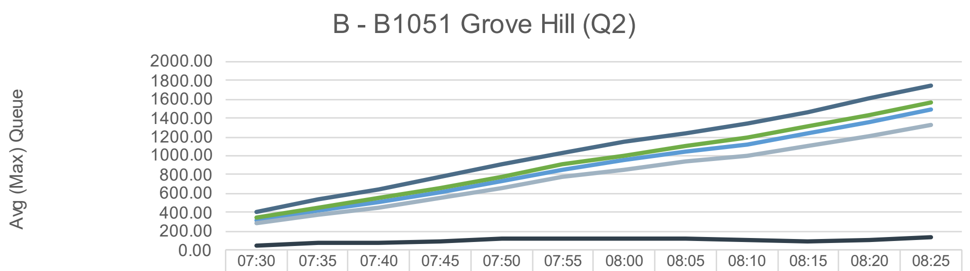
AM Peak - J1 (Lower St / B1051 Grove Hill)



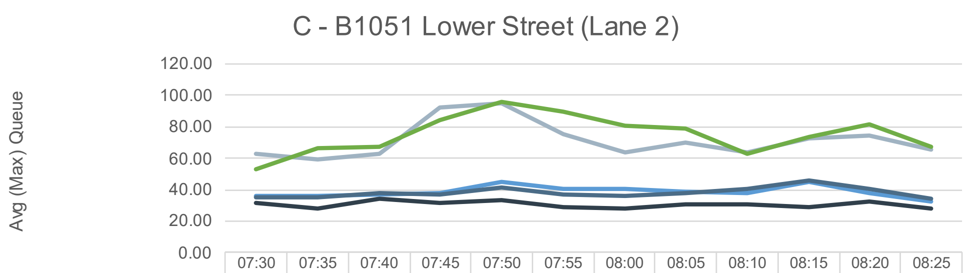
	07:30	07:35	07:40	07:45	07:50	07:55	08:00	08:05	08:10	08:15	08:20	08:25
Base Model	25.89	38.13	58.93	87.75	97.26	93.44	89.81	91.56	86.61	62.37	104.41	114.04
Future Base	53.40	85.44	115.75	174.72	188.99	208.49	225.77	229.15	241.68	247.08	272.75	300.10
Future Base + Dev	63.05	86.69	121.44	162.11	190.96	226.51	228.37	251.75	241.82	253.55	309.07	339.18
Future Base + Mit	201.98	240.79	307.28	414.08	538.95	641.79	702.97	788.15	871.85	947.14	1059.14	1163.81
Future Base + Dev + Mit	205.13	282.69	373.92	494.22	615.92	736.57	818.79	888.53	977.70	1054.59	1162.76	1261.96



	07:30	07:35	07:40	07:45	07:50	07:55	08:00	08:05	08:10	08:15	08:20	08:25
Base Model	25.77	28.81	29.92	28.31	30.54	28.89	27.52	29.01	28.28	30.34	30.25	28.38
Future Base	29.15	31.45	26.69	29.06	28.55	30.07	28.12	29.15	28.75	30.45	27.89	29.20
Future Base + Dev	28.71	26.21	29.51	27.79	28.97	28.98	30.63	27.51	29.43	29.00	28.96	28.65
Future Base + Mit	29.33	32.55	31.74	32.05	32.56	33.51	32.39	31.98	32.82	32.19	31.64	30.84
Future Base + Dev + Mit	31.45	31.69	32.55	33.32	31.01	31.61	32.04	31.17	29.93	32.18	30.91	31.90



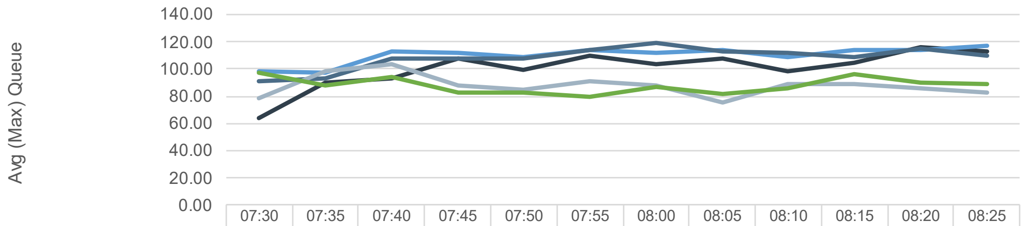
	07:30	07:35	07:40	07:45	07:50	07:55	08:00	08:05	08:10	08:15	08:20	08:25
Base Model	45.84	72.07	79.73	99.93	117.54	123.81	117.61	121.53	105.07	95.46	110.59	135.54
Future Base	314.82	413.29	512.74	621.38	738.10	857.52	949.78	1051.88	1126.71	1239.11	1364.05	1489.45
Future Base + Dev	410.05	534.70	645.79	776.53	906.81	1035.85	1143.69	1244.06	1340.72	1465.50	1605.74	1738.69
Future Base + Mit	282.44	372.17	456.78	553.69	663.00	771.28	853.62	939.83	1006.59	1108.66	1210.22	1323.29
Future Base + Dev + Mit	343.84	449.81	555.38	663.43	782.90	905.46	1006.57	1097.83	1188.14	1314.15	1435.16	1560.14



	07:30	07:35	07:40	07:45	07:50	07:55	08:00	08:05	08:10	08:15	08:20	08:25
Base Model	31.32	28.23	34.63	31.26	33.33	28.58	27.78	30.75	30.32	28.57	32.88	27.72
Future Base	35.83	35.68	36.66	37.69	45.33	40.67	40.84	38.95	38.18	45.26	37.75	32.58
Future Base + Dev	35.03	35.38	38.14	36.64	41.37	37.24	35.77	37.92	40.48	46.31	40.38	34.26
Future Base + Mit	62.65	59.57	62.46	91.94	95.18	75.32	63.34	69.68	63.72	72.86	74.23	65.57
Future Base + Dev + Mit	53.23	66.71	66.93	84.13	95.65	89.27	80.88	79.14	63.03	73.65	81.77	67.13

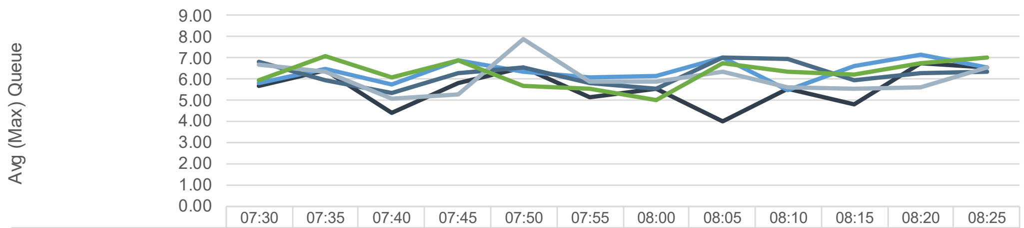
AM Peak - J2 (Chapel Hill / Church Rd Mini R'bout)

A - B1051 Lower Street



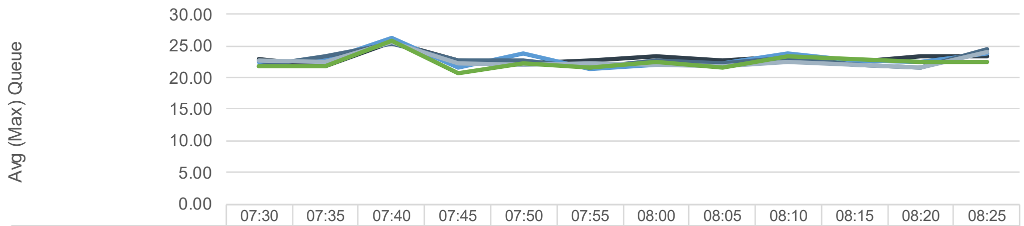
	07:30	07:35	07:40	07:45	07:50	07:55	08:00	08:05	08:10	08:15	08:20	08:25
Base Model	63.69	89.54	92.90	107.67	98.85	109.70	103.76	107.52	97.84	104.09	115.57	113.10
Future Base	98.68	96.77	113.15	112.27	108.74	113.46	112.26	114.17	108.77	113.77	114.04	117.10
Future Base + Dev	91.34	93.00	107.45	107.78	107.93	113.87	119.21	112.66	112.02	108.98	114.99	109.43
Future Base + Mit	78.12	98.60	102.97	87.75	84.43	90.58	87.89	75.11	89.41	88.67	86.27	82.76
Future Base + Dev + Mit	97.64	87.83	93.76	82.19	82.45	79.45	86.43	81.22	85.33	95.90	89.83	88.69

B - Mountfitchet Castle Street



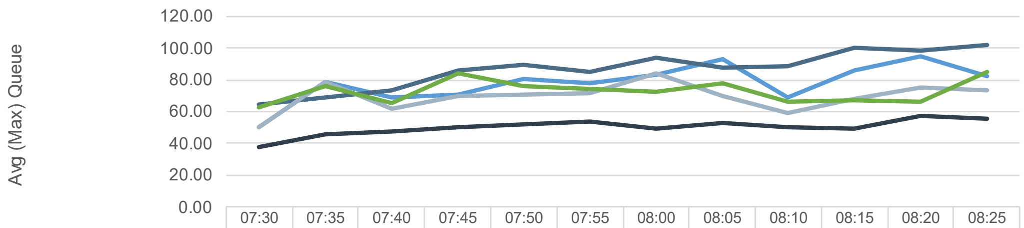
	07:30	07:35	07:40	07:45	07:50	07:55	08:00	08:05	08:10	08:15	08:20	08:25
Base Model	5.64	6.39	4.40	5.84	6.56	5.14	5.57	4.03	5.57	4.78	6.75	6.57
Future Base	5.84	6.45	5.76	6.89	6.33	6.09	6.11	7.01	5.48	6.58	7.12	6.54
Future Base + Dev	6.83	5.91	5.35	6.26	6.52	5.81	5.52	7.03	6.93	5.93	6.26	6.32
Future Base + Mit	6.70	6.36	5.05	5.30	7.86	5.88	5.85	6.37	5.61	5.56	5.63	6.56
Future Base + Dev + Mit	5.92	7.10	6.06	6.89	5.70	5.53	5.02	6.73	6.37	6.18	6.72	7.03

C - Church Road



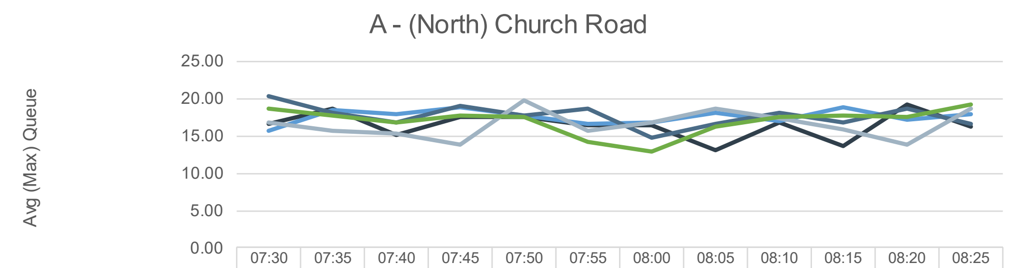
	07:30	07:35	07:40	07:45	07:50	07:55	08:00	08:05	08:10	08:15	08:20	08:25
Base Model	22.81	21.71	25.68	22.62	22.33	22.64	23.32	22.65	23.26	22.51	23.43	23.33
Future Base	22.52	22.62	26.16	21.66	23.76	21.44	22.03	22.34	23.79	22.77	22.40	23.73
Future Base + Dev	21.70	23.39	25.28	22.65	22.71	21.65	22.70	22.28	23.22	22.03	21.59	24.45
Future Base + Mit	22.67	22.51	25.49	22.27	21.91	22.24	21.91	21.84	22.56	22.00	21.61	24.02
Future Base + Dev + Mit	21.69	21.74	25.78	20.61	22.18	21.54	22.48	21.60	23.44	22.87	22.39	22.36

D - B1051 Chapel Hill

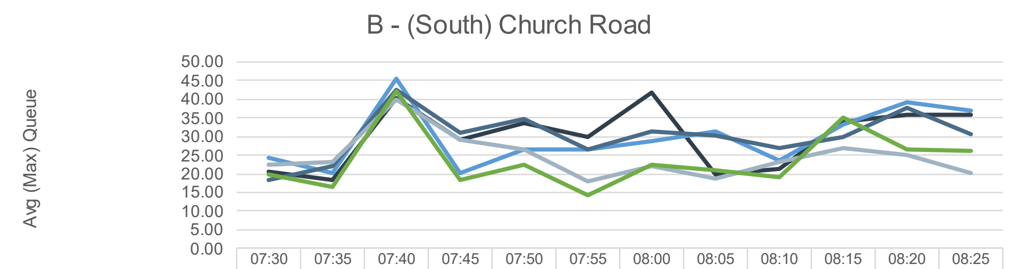


	07:30	07:35	07:40	07:45	07:50	07:55	08:00	08:05	08:10	08:15	08:20	08:25
Base Model	37.34	45.97	47.64	50.23	51.62	53.77	49.63	52.54	50.27	49.08	57.59	55.08
Future Base	50.10	78.79	68.97	71.12	80.46	78.01	83.08	93.08	68.91	85.44	94.97	82.57
Future Base + Dev	64.25	68.63	73.50	85.66	89.01	84.76	93.72	87.73	88.61	100.55	98.31	101.80
Future Base + Mit	50.14	78.42	61.41	69.63	70.46	71.47	84.43	69.88	58.94	67.88	74.84	73.64
Future Base + Dev + Mit	62.76	75.68	64.96	83.88	76.34	74.25	72.57	77.44	66.15	67.08	66.14	85.18

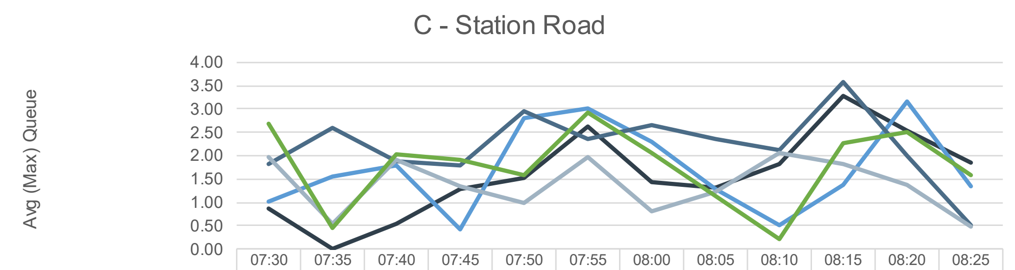
AM Peak - J3 (Station Rd / Church Rd)



	07:30	07:35	07:40	07:45	07:50	07:55	08:00	08:05	08:10	08:15	08:20	08:25
Base Model	16.65	18.67	15.05	17.62	17.58	16.45	16.51	13.04	16.85	13.68	19.18	16.22
Future Base	15.64	18.45	17.85	18.87	17.77	16.62	16.72	18.12	17.07	18.85	17.22	17.95
Future Base + Dev	20.35	18.09	16.76	19.00	17.76	18.61	14.75	16.65	18.19	16.72	18.66	16.66
Future Base + Mit	16.77	15.64	15.32	13.89	19.71	15.61	16.89	18.68	17.34	15.79	13.84	18.60
Future Base + Dev + Mit	18.73	17.76	16.80	17.74	17.63	14.23	12.86	16.16	17.59	17.72	17.63	19.22

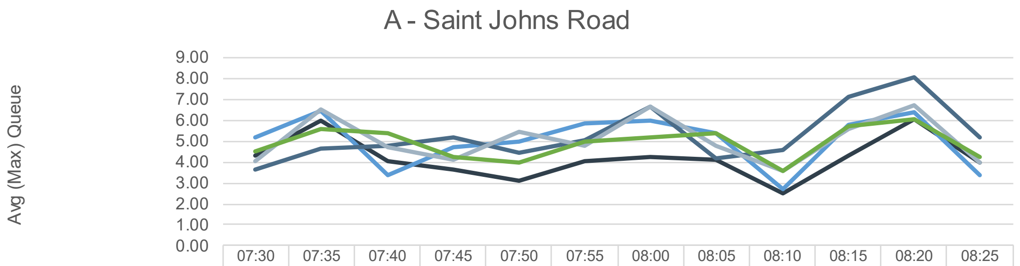


	07:30	07:35	07:40	07:45	07:50	07:55	08:00	08:05	08:10	08:15	08:20	08:25
Base Model	20.46	18.50	40.18	29.02	33.50	29.96	41.80	19.80	21.27	33.78	35.84	35.71
Future Base	24.38	20.05	45.48	20.35	26.65	26.64	28.59	31.47	23.41	33.33	38.98	37.11
Future Base + Dev	18.32	22.00	42.60	31.05	34.61	26.68	31.35	30.31	26.99	29.92	37.53	30.49
Future Base + Mit	22.58	23.15	39.85	29.09	26.37	17.99	22.24	18.86	23.34	26.91	24.90	20.14
Future Base + Dev + Mit	19.99	16.32	42.28	18.45	22.42	14.25	22.28	20.95	19.05	34.89	26.56	26.12

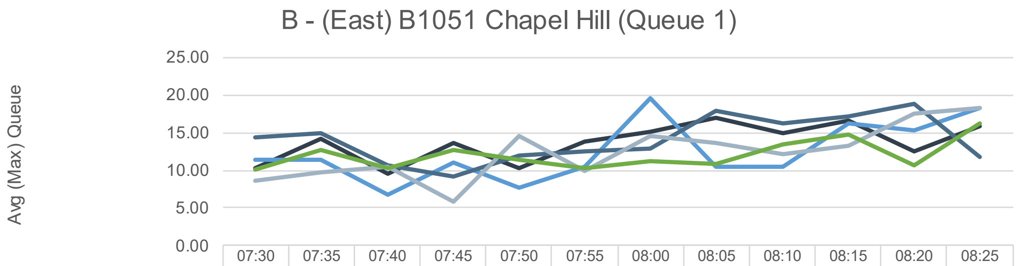


	07:30	07:35	07:40	07:45	07:50	07:55	08:00	08:05	08:10	08:15	08:20	08:25
Base Model	0.88	0.00	0.55	1.29	1.54	2.63	1.44	1.31	1.83	3.29	2.53	1.85
Future Base	1.02	1.55	1.80	0.41	2.79	3.02	2.31	1.29	0.52	1.39	3.16	1.36
Future Base + Dev	1.81	2.60	1.87	1.79	2.95	2.37	2.65	2.37	2.11	3.57	2.00	0.51
Future Base + Mit	1.97	0.54	1.91	1.36	1.00	1.97	0.81	1.24	2.07	1.83	1.38	0.48
Future Base + Dev + Mit	2.68	0.45	2.04	1.90	1.59	2.92	2.05	1.15	0.21	2.26	2.50	1.58

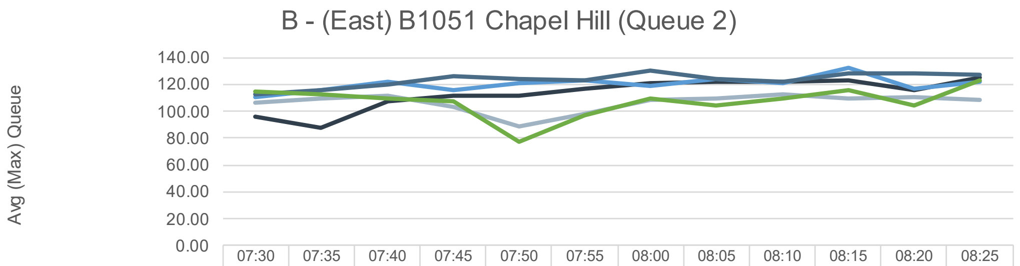
AM Peak - J4 (Chapel Hill / St John's Rd)



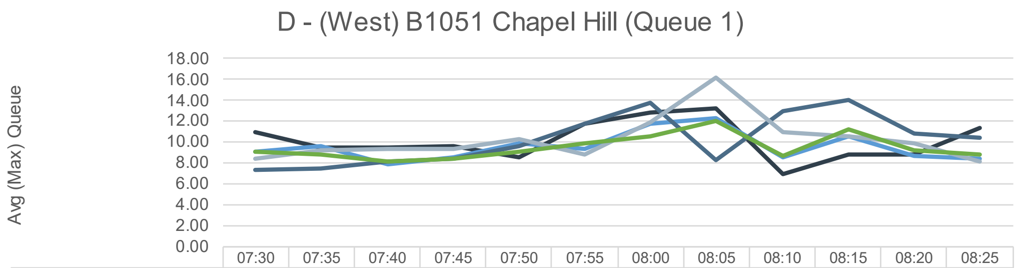
	07:30	07:35	07:40	07:45	07:50	07:55	08:00	08:05	08:10	08:15	08:20	08:25
Base Model	4.32	6.00	4.05	3.67	3.12	4.04	4.22	4.10	2.48	4.34	6.04	3.96
Future Base	5.16	6.48	3.38	4.73	4.98	5.84	5.99	5.40	2.68	5.76	6.36	3.38
Future Base + Dev	3.66	4.63	4.75	5.21	4.43	5.02	6.67	4.15	4.57	7.13	8.07	5.21
Future Base + Mit	4.03	6.55	4.73	4.11	5.47	4.76	6.64	4.79	3.57	5.61	6.72	3.96
Future Base + Dev + Mit	4.51	5.60	5.40	4.23	3.95	4.99	5.18	5.37	3.56	5.71	6.02	4.25



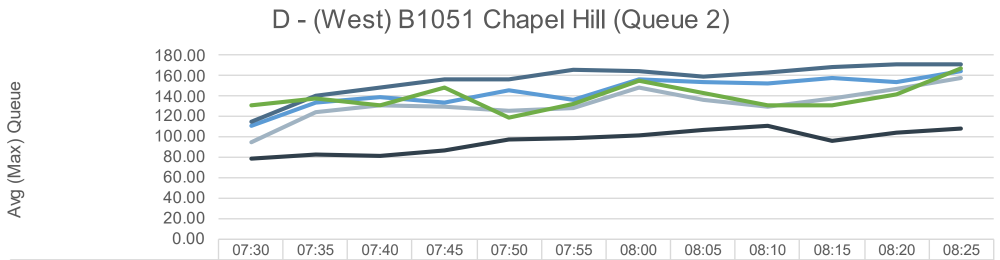
	07:30	07:35	07:40	07:45	07:50	07:55	08:00	08:05	08:10	08:15	08:20	08:25
Base Model	10.35	14.10	9.50	13.56	10.34	13.85	15.10	16.98	14.96	16.63	12.47	15.79
Future Base	11.49	11.44	6.69	11.01	7.60	10.43	19.56	10.47	10.56	16.21	15.31	18.21
Future Base + Dev	14.39	14.87	10.59	9.11	12.05	12.52	12.89	17.94	16.20	17.10	18.86	11.79
Future Base + Mit	8.69	9.77	10.51	5.78	14.56	9.83	14.50	13.71	12.22	13.23	17.50	18.36
Future Base + Dev + Mit	10.14	12.77	10.27	12.76	11.44	10.22	11.20	10.83	13.54	14.73	10.62	16.29



	07:30	07:35	07:40	07:45	07:50	07:55	08:00	08:05	08:10	08:15	08:20	08:25
Base Model	96.26	87.31	107.25	111.71	111.87	117.01	121.49	121.80	121.84	123.63	115.57	124.86
Future Base	110.60	116.11	121.93	116.03	121.17	123.13	118.98	123.72	120.55	132.59	117.36	122.02
Future Base + Dev	112.55	115.87	119.95	126.20	124.19	122.94	130.49	124.66	121.99	127.91	128.04	127.44
Future Base + Mit	106.45	109.39	111.69	103.31	88.52	97.87	108.33	109.67	112.42	109.94	110.32	108.19
Future Base + Dev + Mit	114.65	113.24	110.11	107.77	77.60	97.46	110.06	104.86	109.26	115.67	104.01	123.50



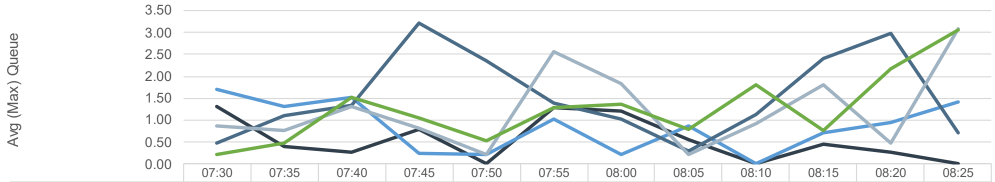
	07:30	07:35	07:40	07:45	07:50	07:55	08:00	08:05	08:10	08:15	08:20	08:25
Base Model	10.90	9.39	9.51	9.60	8.48	11.72	12.80	13.24	6.94	8.81	8.78	11.28
Future Base	9.08	9.53	7.85	8.54	9.83	9.32	11.67	12.27	8.47	10.59	8.59	8.40
Future Base + Dev	7.36	7.47	8.09	8.42	9.54	11.67	13.72	8.31	13.00	13.95	10.85	10.40
Future Base + Mit	8.44	9.16	9.37	9.31	10.24	8.82	11.89	16.19	10.94	10.55	9.80	8.08
Future Base + Dev + Mit	9.07	8.75	8.13	8.43	9.05	9.83	10.58	11.98	8.65	11.26	9.16	8.76



	07:30	07:35	07:40	07:45	07:50	07:55	08:00	08:05	08:10	08:15	08:20	08:25
Base Model	79.18	82.79	80.77	86.15	97.17	98.20	100.82	106.10	111.23	96.37	103.87	107.36
Future Base	110.91	133.82	138.95	134.06	145.02	136.49	155.80	153.60	152.76	156.95	153.04	164.19
Future Base + Dev	115.17	139.78	148.19	156.09	156.86	165.77	164.62	158.59	163.05	168.43	170.68	171.34
Future Base + Mit	94.18	124.30	131.19	129.61	125.82	127.74	148.07	136.14	129.16	137.44	146.74	157.33
Future Base + Dev + Mit	130.20	137.72	130.20	148.30	119.11	132.77	155.50	143.22	131.38	130.39	142.00	166.65

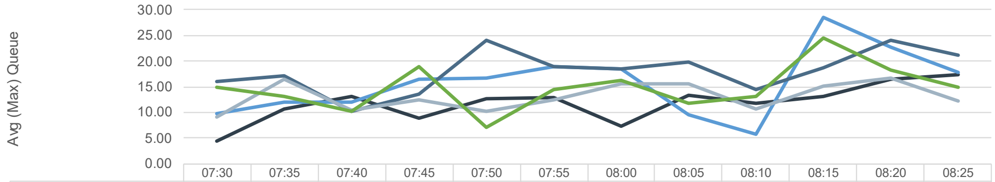
AM Peak - J5 (Chapel Hill / B1383)

A - B1383 Cambridge Road



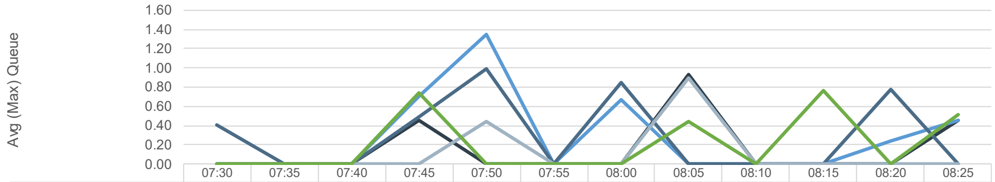
	07:30	07:35	07:40	07:45	07:50	07:55	08:00	08:05	08:10	08:15	08:20	08:25
Base Model	1.32	0.41	0.28	0.78	0.00	1.29	1.21	0.55	0.00	0.46	0.26	0.00
Future Base	1.69	1.32	1.52	0.24	0.21	1.03	0.22	0.87	0.00	0.72	0.96	1.42
Future Base + Dev	0.48	1.11	1.35	3.21	2.36	1.39	1.03	0.29	1.14	2.40	2.98	0.72
Future Base + Mit	0.86	0.76	1.30	0.81	0.22	2.57	1.84	0.23	0.91	1.80	0.47	3.08
Future Base + Dev + Mit	0.21	0.47	1.51	1.05	0.53	1.28	1.37	0.79	1.80	0.76	2.18	3.06

B - B1051 Chapel Hill (Lane 1)



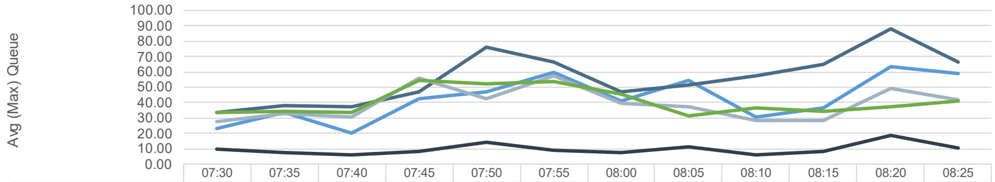
	07:30	07:35	07:40	07:45	07:50	07:55	08:00	08:05	08:10	08:15	08:20	08:25
Base Model	4.45	10.58	13.19	8.77	12.64	12.78	7.34	13.40	11.77	13.06	16.37	17.27
Future Base	9.80	12.07	12.04	16.53	16.69	18.83	18.37	9.57	5.84	28.40	22.63	17.86
Future Base + Dev	15.92	17.02	10.20	13.56	24.13	18.91	18.48	19.86	14.36	18.59	24.01	21.07
Future Base + Mit	9.06	16.52	10.34	12.39	10.13	12.44	15.63	15.55	10.71	15.12	16.79	12.17
Future Base + Dev + Mit	14.94	13.02	10.23	19.00	7.11	14.47	16.16	11.72	13.08	24.50	18.17	14.98

B - B1051 Chapel Hill (Lane 2)

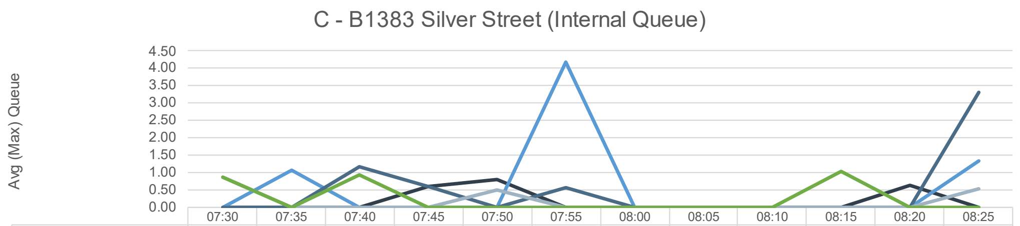


	07:30	07:35	07:40	07:45	07:50	07:55	08:00	08:05	08:10	08:15	08:20	08:25
Base Model	0.00	0.00	0.00	0.45	0.00	0.00	0.00	0.93	0.00	0.00	0.00	0.46
Future Base	0.00	0.00	0.00	0.71	1.35	0.00	0.67	0.00	0.00	0.00	0.24	0.46
Future Base + Dev	0.41	0.00	0.00	0.49	0.99	0.00	0.85	0.00	0.00	0.00	0.78	0.00
Future Base + Mit	0.00	0.00	0.00	0.00	0.44	0.00	0.00	0.90	0.00	0.00	0.00	0.00
Future Base + Dev + Mit	0.00	0.00	0.00	0.74	0.00	0.00	0.00	0.44	0.00	0.76	0.00	0.51

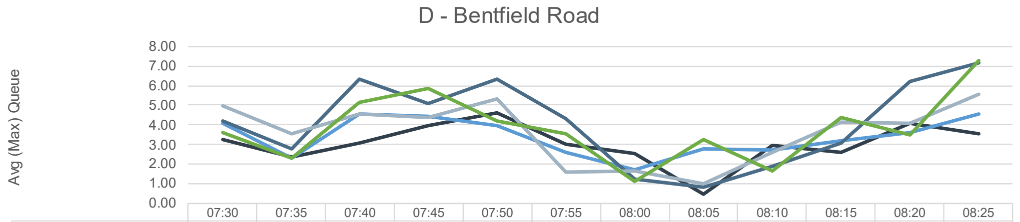
C - B1383 Silver Street



	07:30	07:35	07:40	07:45	07:50	07:55	08:00	08:05	08:10	08:15	08:20	08:25
Base Model	9.62	7.61	6.01	8.51	14.13	8.87	7.72	11.54	6.29	8.10	18.52	10.82
Future Base	22.91	33.62	20.37	42.32	47.02	59.35	40.76	54.18	30.80	36.73	63.34	58.85
Future Base + Dev	33.52	38.46	37.49	47.31	76.06	66.01	46.81	51.42	57.41	64.58	87.66	66.29
Future Base + Mit	27.72	32.82	30.69	55.64	42.43	57.38	39.72	37.61	28.23	28.28	48.89	42.05
Future Base + Dev + Mit	33.90	34.11	33.31	54.38	52.11	53.55	45.43	31.46	36.51	34.72	37.22	41.23

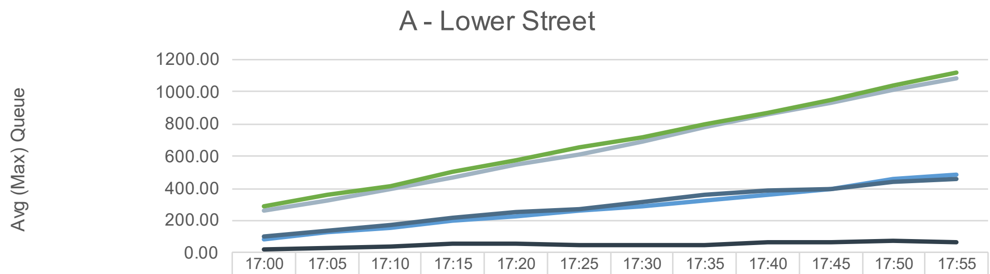


	07:30	07:35	07:40	07:45	07:50	07:55	08:00	08:05	08:10	08:15	08:20	08:25
Base Model	0.00	0.00	0.00	0.58	0.78	0.00	0.00	0.00	0.00	0.00	0.62	0.00
Future Base	0.00	1.05	0.00	0.00	0.00	4.18	0.00	0.00	0.00	0.00	0.00	1.32
Future Base + Dev	0.00	0.00	1.16	0.58	0.00	0.55	0.00	0.00	0.00	0.00	0.00	3.31
Future Base + Mit	0.85	0.00	0.00	0.00	0.49	0.00	0.00	0.00	0.00	0.00	0.00	0.52
Future Base + Dev + Mit	0.84	0.00	0.92	0.00	0.00	0.00	0.00	0.00	0.00	1.03	0.00	0.00

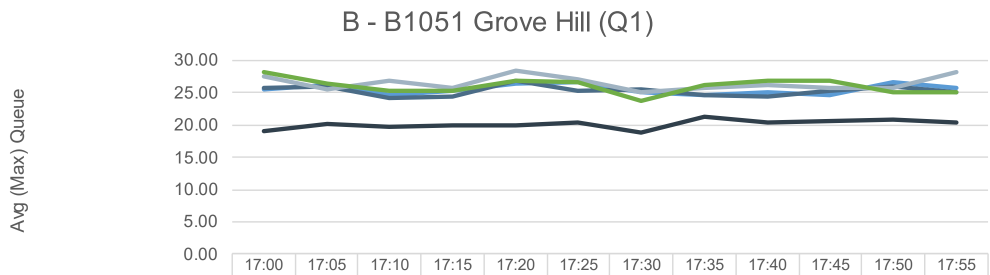


	07:30	07:35	07:40	07:45	07:50	07:55	08:00	08:05	08:10	08:15	08:20	08:25
Base Model	3.22	2.38	3.07	3.98	4.64	3.03	2.53	0.44	2.93	2.61	4.08	3.53
Future Base	4.09	2.27	4.55	4.46	3.96	2.60	1.69	2.77	2.71	3.19	3.59	4.56
Future Base + Dev	4.20	2.75	6.31	5.11	6.32	4.30	1.22	0.78	1.89	3.07	6.20	7.15
Future Base + Mit	4.94	3.56	4.58	4.37	5.35	1.58	1.66	1.01	2.58	4.12	4.05	5.58
Future Base + Dev + Mit	3.63	2.28	5.15	5.88	4.22	3.56	1.11	3.26	1.63	4.35	3.46	7.30

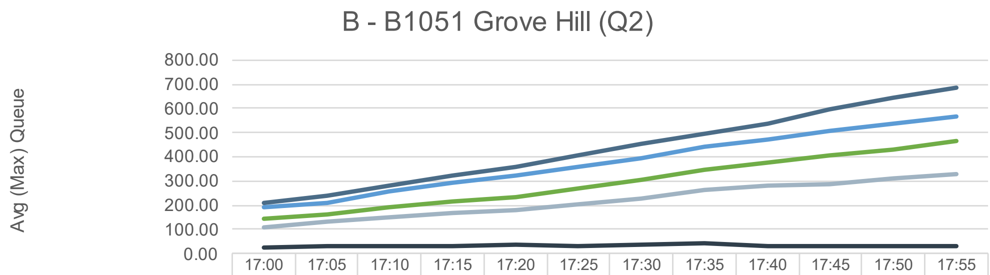
PM Peak - J1 (Lower St / B1051 Grove Hill)



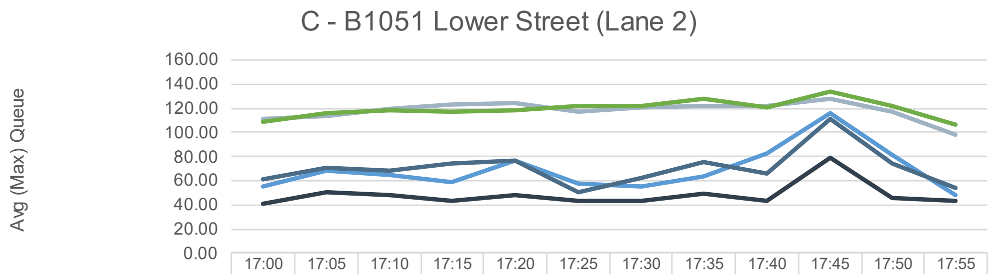
	17:00	17:05	17:10	17:15	17:20	17:25	17:30	17:35	17:40	17:45	17:50	17:55
Base Model	21.69	31.77	41.31	53.42	54.55	52.04	46.04	51.89	67.91	64.72	75.05	67.17
Future Base	86.75	125.85	153.46	199.58	227.83	260.18	284.84	321.67	358.55	395.30	455.28	485.60
Future Base + Dev	100.55	136.99	175.64	217.73	253.76	274.09	311.54	356.45	385.01	397.68	439.55	460.78
Future Base + Mit	258.03	328.29	393.44	467.92	549.28	614.41	690.50	781.84	860.80	929.80	1008.18	1084.33
Future Base + Dev + Mit	286.08	358.12	416.77	502.92	570.49	656.43	719.62	798.77	872.78	952.04	1042.60	1116.66



	17:00	17:05	17:10	17:15	17:20	17:25	17:30	17:35	17:40	17:45	17:50	17:55
Base Model	19.05	20.25	19.76	19.88	19.96	20.44	18.89	21.21	20.40	20.54	20.80	20.29
Future Base	25.43	26.12	24.69	25.19	26.41	26.62	25.10	24.68	25.06	24.69	26.54	25.73
Future Base + Dev	25.79	26.05	24.21	24.41	26.84	25.27	25.53	24.64	24.45	25.25	25.93	24.96
Future Base + Mit	27.48	25.55	26.74	25.71	28.37	27.00	25.07	25.79	26.16	25.66	25.66	28.25
Future Base + Dev + Mit	28.19	26.35	25.37	25.35	26.81	26.63	23.69	26.18	26.84	26.82	25.05	25.02

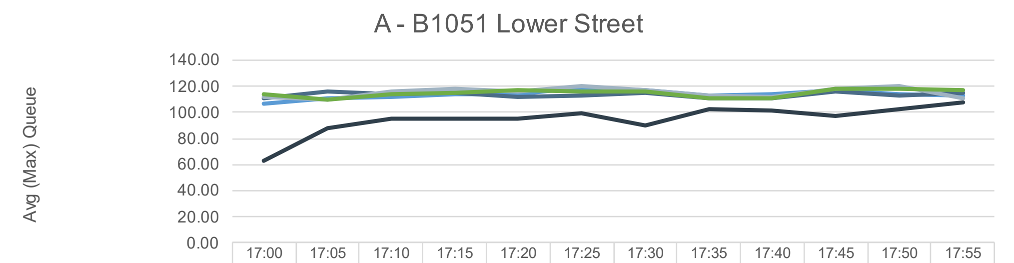


	17:00	17:05	17:10	17:15	17:20	17:25	17:30	17:35	17:40	17:45	17:50	17:55
Base Model	22.97	28.79	28.73	29.67	36.46	33.77	35.73	43.79	32.66	31.90	31.72	28.84
Future Base	190.34	212.49	255.81	295.45	325.15	359.55	396.79	441.23	469.38	504.83	536.96	566.71
Future Base + Dev	207.11	241.22	282.57	321.09	361.16	408.15	450.84	496.70	539.19	594.12	641.88	687.38
Future Base + Mit	111.09	133.66	150.31	168.81	182.09	204.16	227.98	261.36	279.73	287.82	309.24	325.93
Future Base + Dev + Mit	143.57	163.08	191.15	215.08	235.20	267.59	303.63	345.38	373.82	404.66	431.06	464.38

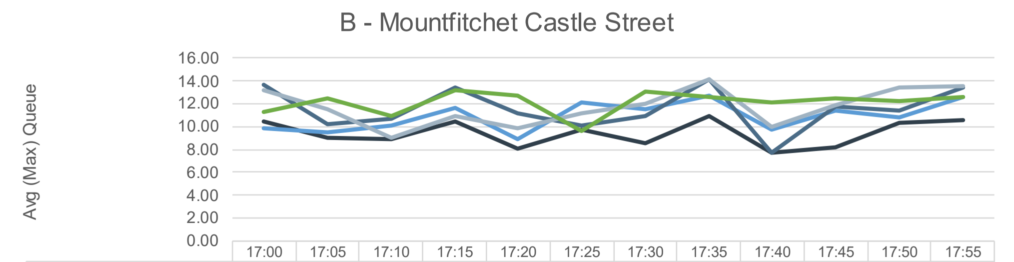


	17:00	17:05	17:10	17:15	17:20	17:25	17:30	17:35	17:40	17:45	17:50	17:55
Base Model	41.44	50.91	47.65	43.80	47.50	43.05	42.86	49.16	43.57	79.30	45.39	42.83
Future Base	54.82	68.68	65.27	58.85	76.69	58.04	55.35	63.95	83.10	116.09	80.91	48.49
Future Base + Dev	61.57	70.23	68.30	74.36	77.01	50.31	62.59	74.99	65.87	110.91	73.85	54.54
Future Base + Mit	110.80	113.30	118.99	122.53	123.77	116.77	120.88	121.29	122.17	127.99	117.57	97.90
Future Base + Dev + Mit	108.23	116.24	117.73	117.11	117.81	121.84	122.00	128.04	120.72	133.85	122.15	106.74

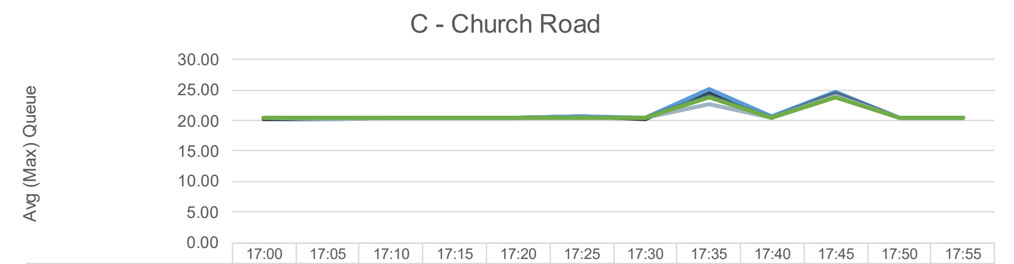
PM Peak - J2 (Chapel Hill / Church Rd Mini R'bout)



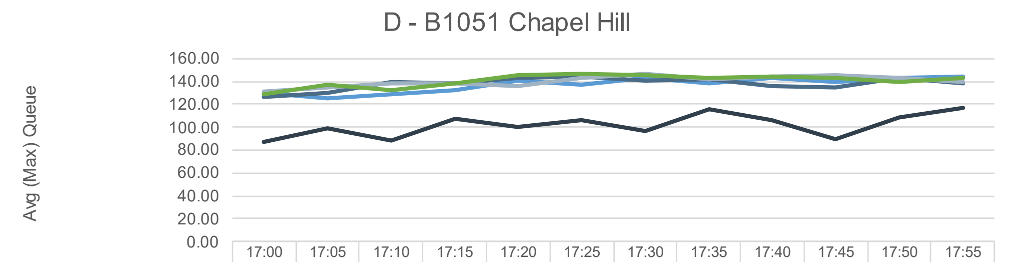
	17:00	17:05	17:10	17:15	17:20	17:25	17:30	17:35	17:40	17:45	17:50	17:55
Base Model	62.47	87.91	95.36	95.19	95.38	98.85	89.97	102.85	101.66	97.42	102.83	107.86
Future Base	106.19	110.80	111.85	114.28	113.92	119.58	116.67	113.34	113.88	117.52	113.68	112.65
Future Base + Dev	110.69	116.18	114.29	114.51	112.22	113.15	114.79	110.56	110.32	116.15	113.27	115.26
Future Base + Mit	111.71	109.58	116.20	117.83	115.66	120.13	117.05	112.82	111.42	118.35	120.25	111.04
Future Base + Dev + Mit	113.57	110.18	113.51	114.89	116.97	116.29	115.53	111.26	110.79	118.07	118.27	116.71



	17:00	17:05	17:10	17:15	17:20	17:25	17:30	17:35	17:40	17:45	17:50	17:55
Base Model	10.48	9.02	8.93	10.40	8.04	9.72	8.51	10.95	7.67	8.16	10.37	10.56
Future Base	9.80	9.44	10.07	11.64	8.85	12.13	11.57	12.75	9.71	11.42	10.76	12.62
Future Base + Dev	13.71	10.20	10.64	13.42	11.11	10.10	10.89	14.16	7.76	11.78	11.45	13.41
Future Base + Mit	13.21	11.46	9.04	10.93	9.80	11.12	11.97	14.14	10.00	11.92	13.39	13.54
Future Base + Dev + Mit	11.23	12.44	10.97	13.15	12.74	9.56	13.09	12.63	12.13	12.52	12.24	12.53

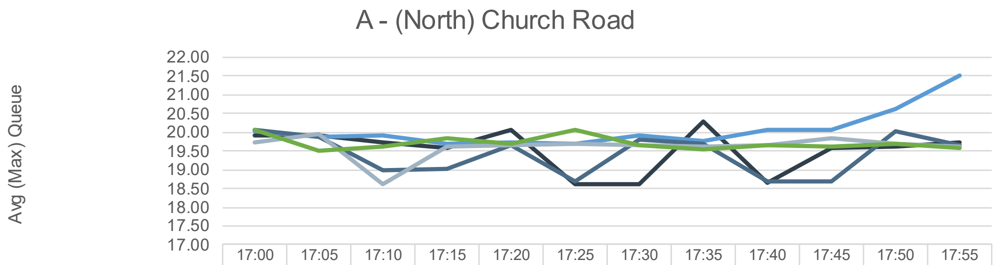


	17:00	17:05	17:10	17:15	17:20	17:25	17:30	17:35	17:40	17:45	17:50	17:55
Base Model	20.33	20.23	20.53	20.41	20.41	20.65	20.16	24.68	20.54	24.40	20.43	20.53
Future Base	20.48	20.53	20.38	20.42	20.50	20.61	20.41	25.10	20.60	24.69	20.45	20.37
Future Base + Dev	20.48	20.38	20.39	20.48	20.41	20.55	20.53	24.00	20.57	24.38	20.41	20.35
Future Base + Mit	20.42	20.34	20.53	20.52	20.50	20.49	20.51	22.78	20.53	24.02	20.46	20.38
Future Base + Dev + Mit	20.51	20.50	20.51	20.52	20.45	20.43	20.46	23.79	20.46	23.74	20.47	20.45

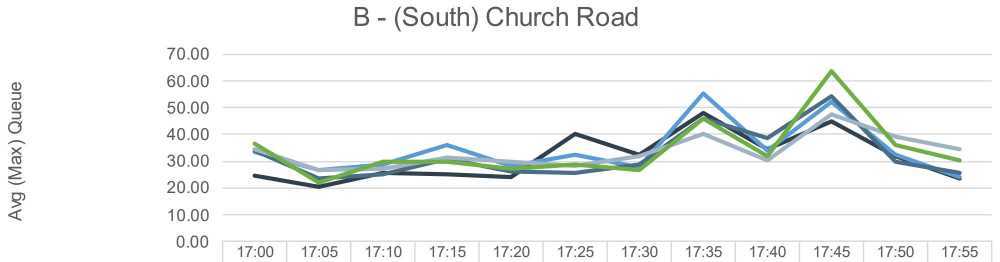


	17:00	17:05	17:10	17:15	17:20	17:25	17:30	17:35	17:40	17:45	17:50	17:55
Base Model	86.65	99.58	87.98	107.01	99.97	106.03	96.26	115.88	106.30	89.18	108.28	116.51
Future Base	130.50	125.22	128.52	132.90	141.11	137.13	142.87	138.06	142.49	139.79	143.16	144.18
Future Base + Dev	126.74	130.52	139.72	138.17	143.17	143.80	140.52	142.26	136.46	135.21	142.76	138.36
Future Base + Mit	130.78	134.75	138.78	138.47	135.66	143.30	146.38	142.23	143.76	145.63	142.88	139.18
Future Base + Dev + Mit	128.92	137.65	132.16	138.45	145.47	146.03	145.62	143.49	144.33	143.39	139.32	142.62

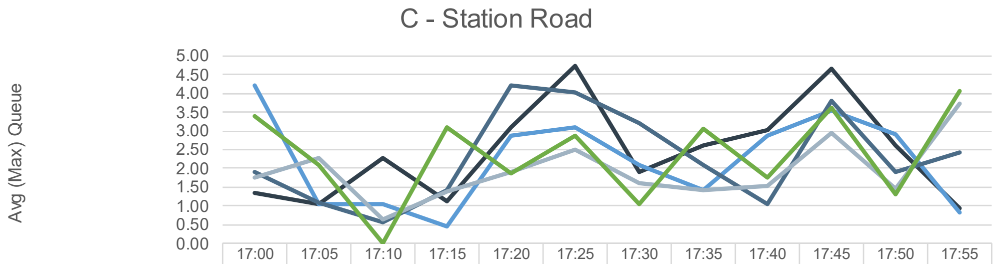
PM Peak - J3 (Station Rd / Church Rd)



	17:00	17:05	17:10	17:15	17:20	17:25	17:30	17:35	17:40	17:45	17:50	17:55
Base Model	19.92	19.92	19.72	19.58	20.08	18.61	18.63	20.29	18.65	19.58	19.63	19.74
Future Base	20.01	19.87	19.93	19.68	19.73	19.70	19.91	19.75	20.06	20.07	20.62	21.50
Future Base + Dev	20.05	19.86	18.97	19.01	19.64	18.67	19.79	19.69	18.69	18.67	20.01	19.64
Future Base + Mit	19.72	19.97	18.62	19.60	19.67	19.71	19.67	19.63	19.64	19.85	19.69	19.61
Future Base + Dev + Mit	20.08	19.51	19.60	19.84	19.68	20.08	19.67	19.53	19.65	19.62	19.70	19.59



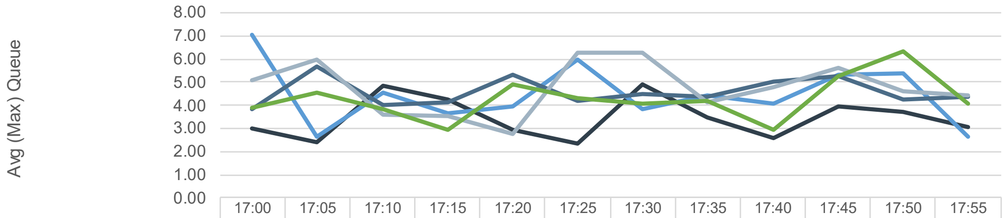
	17:00	17:05	17:10	17:15	17:20	17:25	17:30	17:35	17:40	17:45	17:50	17:55
Base Model	24.84	20.62	25.80	25.42	24.30	40.27	32.46	47.90	34.72	44.96	32.10	23.45
Future Base	33.73	26.79	28.97	36.05	28.38	32.40	27.84	55.33	34.16	52.33	32.60	24.20
Future Base + Dev	34.03	23.54	25.19	31.13	26.03	25.73	28.67	45.74	38.81	54.43	29.82	25.85
Future Base + Mit	34.33	26.84	27.15	31.36	29.88	28.37	32.04	40.18	30.37	47.65	39.47	34.53
Future Base + Dev + Mit	36.48	21.93	29.74	29.62	27.14	28.65	26.55	45.77	32.18	63.90	35.87	30.18



	17:00	17:05	17:10	17:15	17:20	17:25	17:30	17:35	17:40	17:45	17:50	17:55
Base Model	1.34	1.05	2.27	1.13	3.10	4.74	1.89	2.63	3.01	4.65	2.62	0.94
Future Base	4.22	1.04	1.06	0.47	2.89	3.09	2.10	1.42	2.86	3.55	2.92	0.84
Future Base + Dev	1.89	1.10	0.55	1.42	4.20	4.03	3.21	2.10	1.06	3.81	1.91	2.42
Future Base + Mit	1.76	2.29	0.64	1.40	1.89	2.51	1.61	1.42	1.52	2.93	1.45	3.72
Future Base + Dev + Mit	3.41	2.11	0.00	3.08	1.87	2.86	1.05	3.07	1.75	3.62	1.30	4.05

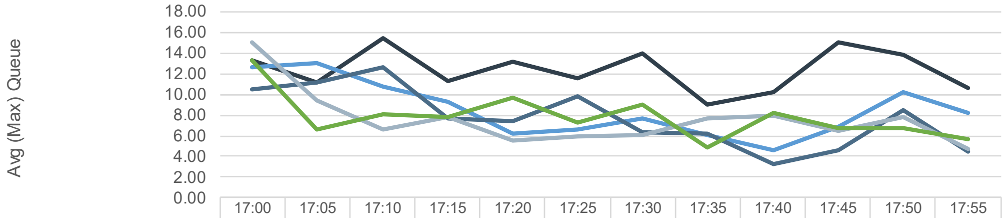
PM Peak - J4 (Chapel Hill / St John's Rd)

A - Saint Johns Road



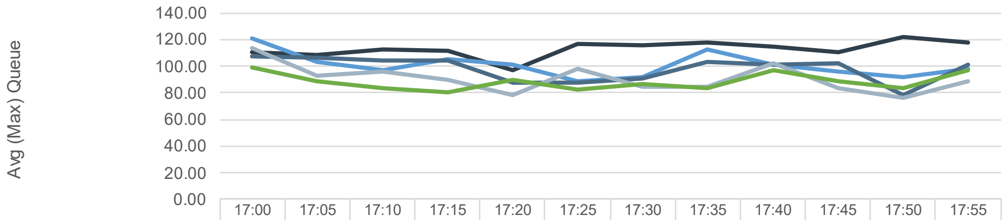
	17:00	17:05	17:10	17:15	17:20	17:25	17:30	17:35	17:40	17:45	17:50	17:55
Base Model	3.02	2.42	4.87	4.27	2.94	2.36	4.92	3.50	2.59	3.93	3.74	3.04
Future Base	7.05	2.65	4.53	3.67	3.93	5.99	3.81	4.44	4.04	5.33	5.38	2.67
Future Base + Dev	3.86	5.68	3.99	4.10	5.31	4.16	4.47	4.38	5.01	5.24	4.24	4.39
Future Base + Mit	5.09	5.95	3.61	3.52	2.75	6.25	6.27	4.13	4.81	5.62	4.60	4.43
Future Base + Dev + Mit	3.89	4.56	3.83	2.92	4.91	4.33	4.06	4.18	2.92	5.26	6.34	4.07

B - (East) B1051 Chapel Hill (Queue 1)



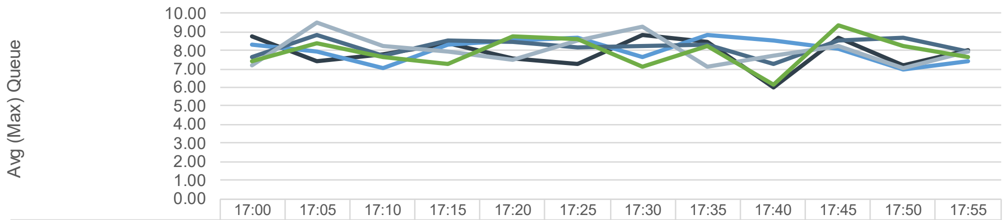
	17:00	17:05	17:10	17:15	17:20	17:25	17:30	17:35	17:40	17:45	17:50	17:55
Base Model	13.26	11.17	15.44	11.28	13.22	11.60	13.95	9.06	10.26	15.04	13.82	10.68
Future Base	12.58	13.06	10.72	9.32	6.22	6.59	7.63	6.09	4.56	6.90	10.24	8.19
Future Base + Dev	10.55	11.21	12.58	7.71	7.39	9.80	6.38	6.19	3.21	4.54	8.49	4.51
Future Base + Mit	15.03	9.43	6.64	7.87	5.52	6.00	6.07	7.68	8.00	6.50	7.85	4.75
Future Base + Dev + Mit	13.29	6.66	8.05	7.87	9.74	7.28	9.01	4.82	8.26	6.72	6.71	5.62

B - (East) B1051 Chapel Hill (Queue 2)

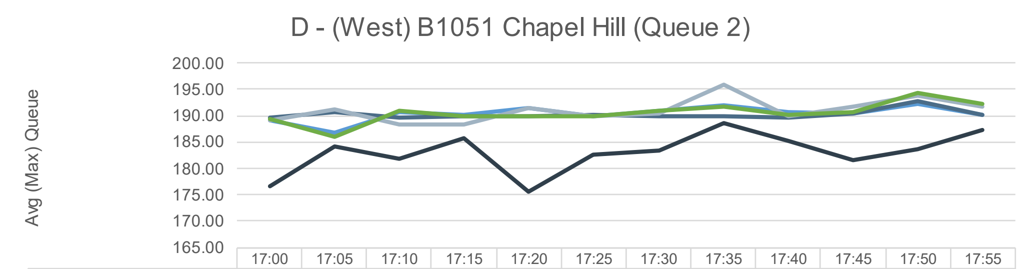


	17:00	17:05	17:10	17:15	17:20	17:25	17:30	17:35	17:40	17:45	17:50	17:55
Base Model	110.36	108.36	112.45	111.91	97.01	116.65	115.41	118.14	114.46	110.57	122.47	117.78
Future Base	121.13	102.92	97.22	105.26	101.10	89.00	92.07	112.70	101.48	96.17	91.50	97.94
Future Base + Dev	107.93	106.27	104.26	104.52	88.26	88.26	91.09	103.13	101.71	102.31	78.79	101.43
Future Base + Mit	113.59	92.49	96.50	89.90	78.73	97.90	84.19	84.59	102.55	83.61	76.44	88.43
Future Base + Dev + Mit	99.38	89.29	83.96	80.09	89.82	82.55	86.45	83.93	97.06	88.57	83.97	97.26

D - (West) B1051 Chapel Hill (Queue 1)

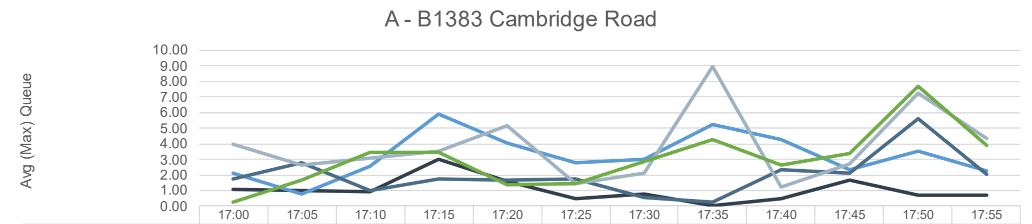


	17:00	17:05	17:10	17:15	17:20	17:25	17:30	17:35	17:40	17:45	17:50	17:55
Base Model	8.77	7.38	7.79	8.36	7.58	7.25	8.82	8.42	6.03	8.68	7.21	7.99
Future Base	8.29	7.96	7.06	8.27	8.52	8.64	7.66	8.80	8.56	8.07	6.95	7.38
Future Base + Dev	7.64	8.79	7.74	8.54	8.45	8.13	8.25	8.28	7.26	8.52	8.71	7.94
Future Base + Mit	7.15	9.49	8.21	7.96	7.46	8.56	9.25	7.12	7.69	8.23	7.03	7.95
Future Base + Dev + Mit	7.41	8.39	7.61	7.29	8.78	8.62	7.08	8.26	6.16	9.38	8.26	7.66

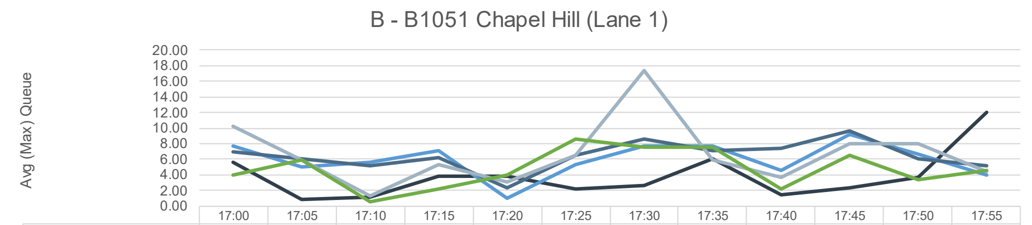


	17:00	17:05	17:10	17:15	17:20	17:25	17:30	17:35	17:40	17:45	17:50	17:55
Base Model	176.61	184.11	181.96	185.87	175.71	182.61	183.47	188.52	185.26	181.64	183.72	187.31
Future Base	189.05	186.66	190.60	190.29	191.43	189.90	190.87	191.92	190.62	190.34	192.13	190.18
Future Base + Dev	189.73	190.63	189.73	189.81	189.81	190.15	189.97	189.89	189.76	190.55	192.72	190.17
Future Base + Mit	189.03	191.23	188.24	188.28	191.38	189.81	190.44	195.87	189.84	191.82	193.75	191.69
Future Base + Dev + Mit	189.42	185.90	190.98	189.87	189.93	189.83	190.84	191.74	190.21	190.64	194.43	192.19

PM Peak - J5 (Chapel Hill / B1383)



	17:00	17:05	17:10	17:15	17:20	17:25	17:30	17:35	17:40	17:45	17:50	17:55
Base Model	1.04	0.99	0.91	3.00	1.57	0.51	0.80	0.00	0.49	1.67	0.72	0.69
Future Base	2.10	0.79	2.54	5.91	4.03	2.76	2.98	5.22	4.25	2.31	3.54	2.24
Future Base + Dev	1.72	2.80	0.97	1.76	1.63	1.77	0.54	0.26	2.32	2.11	5.61	2.06
Future Base + Mit	4.00	2.63	3.08	3.54	5.15	1.42	2.14	8.96	1.22	2.68	7.25	4.33
Future Base + Dev + Mit	0.23	1.66	3.45	3.42	1.34	1.45	2.87	4.27	2.60	3.34	7.71	3.88



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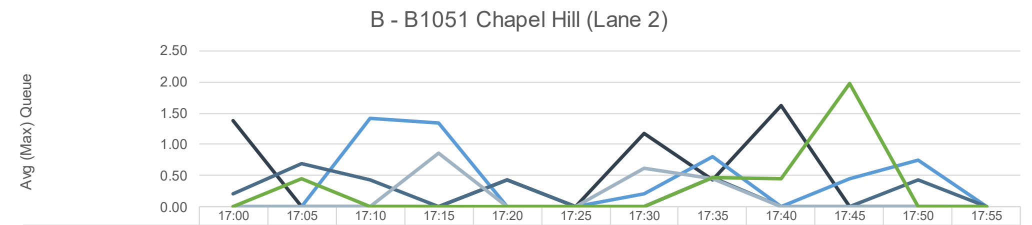
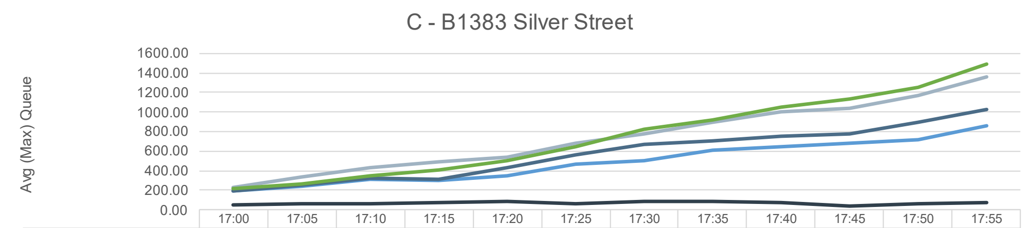
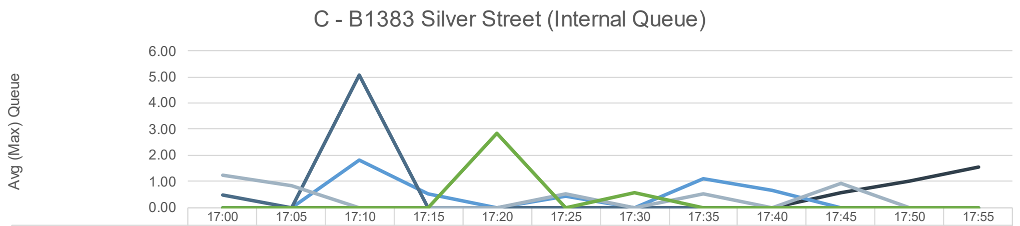
Base Model	5.63	0.85	1.13	3.83	3.88	2.21	2.61	6.04	1.49	2.32	3.65	12.02
Future Base	7.70	5.08	5.60	7.09	1.04	5.31	7.64	7.69	4.62	9.26	6.61	3.91
Future Base + Dev	6.99	6.07	5.18	6.21	2.40	6.50	8.56	7.04	7.38	9.61	6.13	5.11
Future Base + Mit	10.20	5.90	1.36	5.26	3.05	6.50	17.39	5.85	3.68	8.07	8.07	4.37
Future Base + Dev + Mit	4.04	5.94	0.55	2.22	4.02	8.66	7.49	7.57	2.24	6.44	3.41	4.57



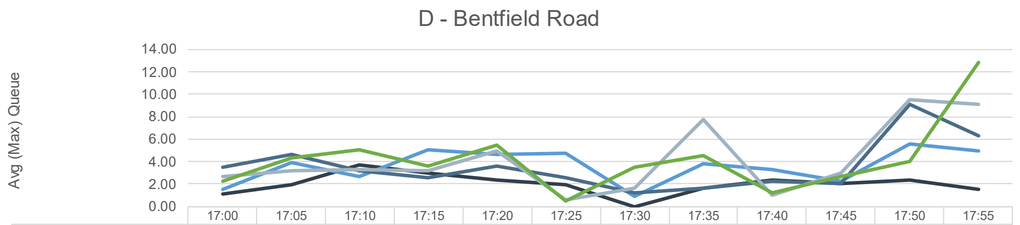
	17:00	17:05	17:10	17:15	17:20	17:25	17:30	17:35	17:40	17:45	17:50	17:55
Base Model	1.38	0.00	0.00	0.00	0.44	0.00	1.17	0.43	1.63	0.00	0.00	0.00
Future Base	0.00	0.00	1.42	1.34	0.00	0.00	0.21	0.81	0.00	0.46	0.74	0.00
Future Base + Dev	0.21	0.69	0.44	0.00	0.44	0.00	0.00	0.47	0.00	0.00	0.44	0.00
Future Base + Mit	0.00	0.00	0.00	0.86	0.00	0.00	0.62	0.46	0.00	0.00	0.00	0.00
Future Base + Dev + Mit	0.00	0.46	0.00	0.00	0.00	0.00	0.00	0.47	0.45	1.98	0.00	0.00



	17:00	17:05	17:10	17:15	17:20	17:25	17:30	17:35	17:40	17:45	17:50	17:55
Base Model	50.53	61.92	67.72	75.11	80.51	58.69	84.00	80.33	72.47	39.19	67.47	78.18
Future Base	192.91	240.72	313.20	303.64	352.62	462.57	503.74	609.65	642.12	677.58	718.51	861.39
Future Base + Dev	187.12	258.15	321.48	306.18	431.35	561.36	667.31	706.53	750.29	781.62	890.47	1030.80
Future Base + Mit	226.44	334.37	434.49	489.75	538.84	674.90	779.75	889.33	998.73	1037.49	1166.55	1355.27
Future Base + Dev + Mit	212.65	264.22	349.86	401.29	501.53	648.28	819.45	914.84	1046.06	1135.47	1249.10	1494.06



	17:00	17:05	17:10	17:15	17:20	17:25	17:30	17:35	17:40	17:45	17:50	17:55
Base Model	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.57	1.01	1.55
Future Base	0.00	0.00	1.81	0.53	0.00	0.44	0.00	1.08	0.63	0.00	0.00	0.00
Future Base + Dev	0.49	0.00	5.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Future Base + Mit	1.24	0.84	0.00	0.00	0.00	0.51	0.00	0.52	0.00	0.91	0.00	0.00
Future Base + Dev + Mit	0.00	0.00	0.00	0.00	2.83	0.00	0.56	0.00	0.00	0.00	0.00	0.00



	17:00	17:05	17:10	17:15	17:20	17:25	17:30	17:35	17:40	17:45	17:50	17:55
Base Model	1.13	1.94	3.66	3.02	2.30	1.88	0.00	1.59	2.36	2.05	2.38	1.56
Future Base	1.55	3.86	2.70	5.06	4.59	4.75	0.88	3.81	3.26	2.25	5.62	4.90
Future Base + Dev	3.53	4.67	3.16	2.54	3.59	2.55	1.22	1.60	2.25	2.03	9.14	6.26
Future Base + Mit	2.66	3.15	3.33	3.13	4.90	0.55	1.58	7.80	1.02	2.95	9.51	9.06
Future Base + Dev + Mit	2.19	4.35	5.06	3.57	5.43	0.51	3.45	4.54	1.24	2.67	4.02	12.83

Modelling Group Ltd
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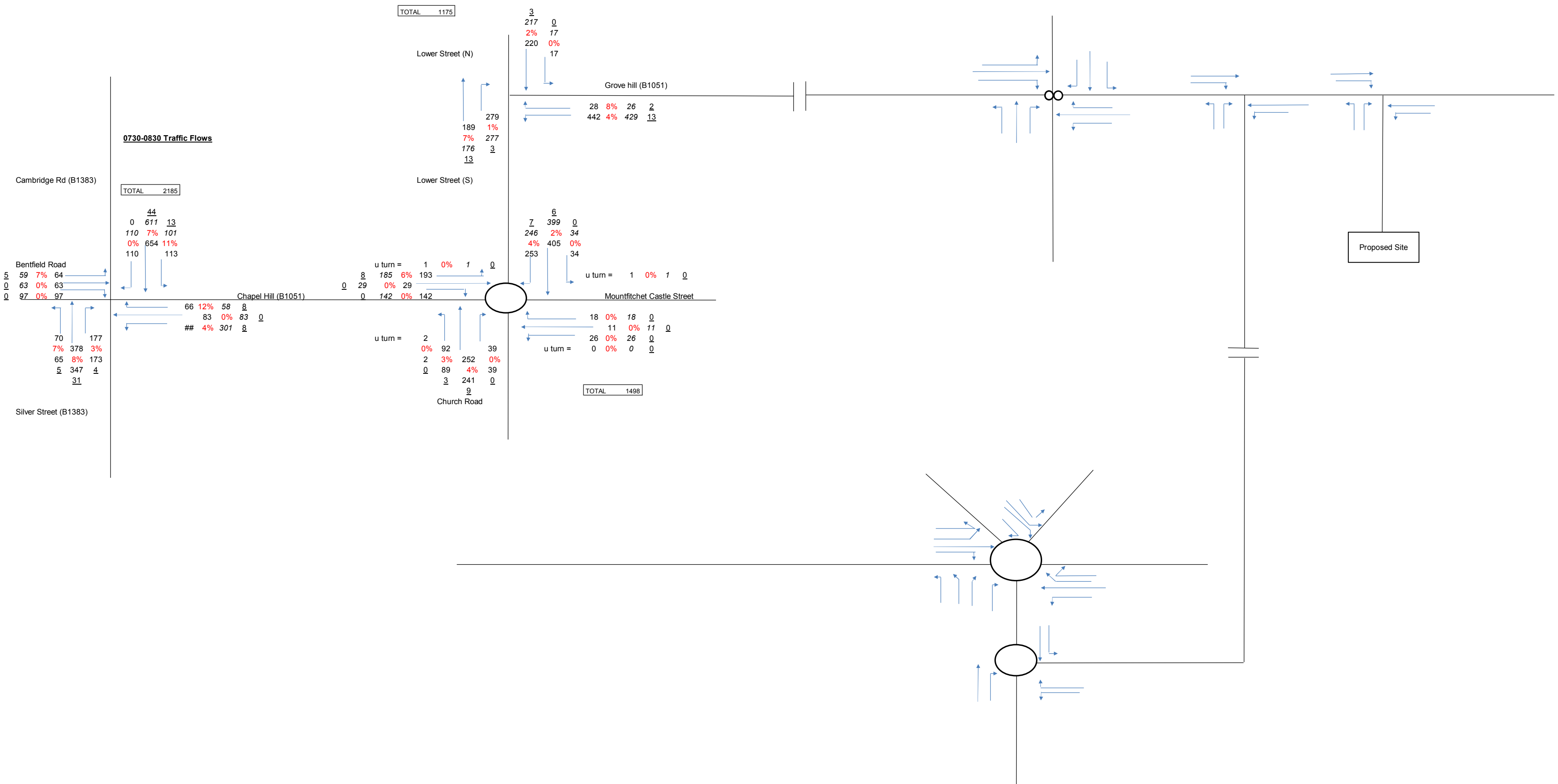
Birmingham
B45 8DF

[redacted]

Registered in England & Wales: 12262604
Registered address: Crosby Court, 28 George Street, Birmingham B3 1QG

Appendix L



Tempro Growth Factor:	1.00015

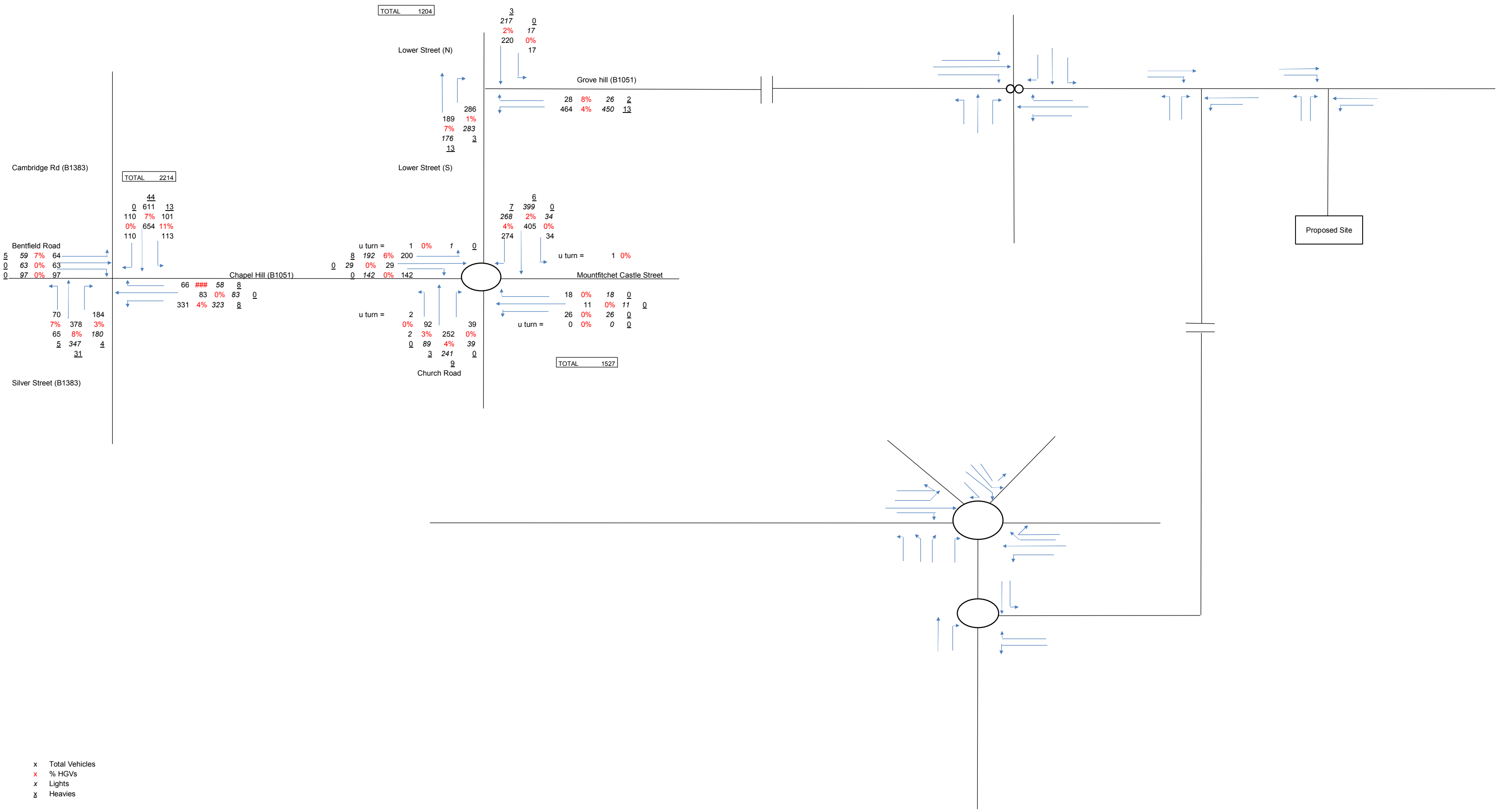
- x Total Vehicles
- x % HGVs
- *x* Lights
- x Heavies

ARDENT CONSULTING ENGINEERS

Third Floor, The Hallmark Building
52-56 Leadenhall Street
London EC3M 5JE

Client	Project	
Countryside	**Land South of Henham Road, Elsenham**	
Date: **July 2022**	Job No: **2008170**	Drawing No

2027 Base Flows (using 2022 survey flows + Tempro + Committed Dev) - AM Peak



x Total Vehicles
x % HGVs
x Lights
x Heavies

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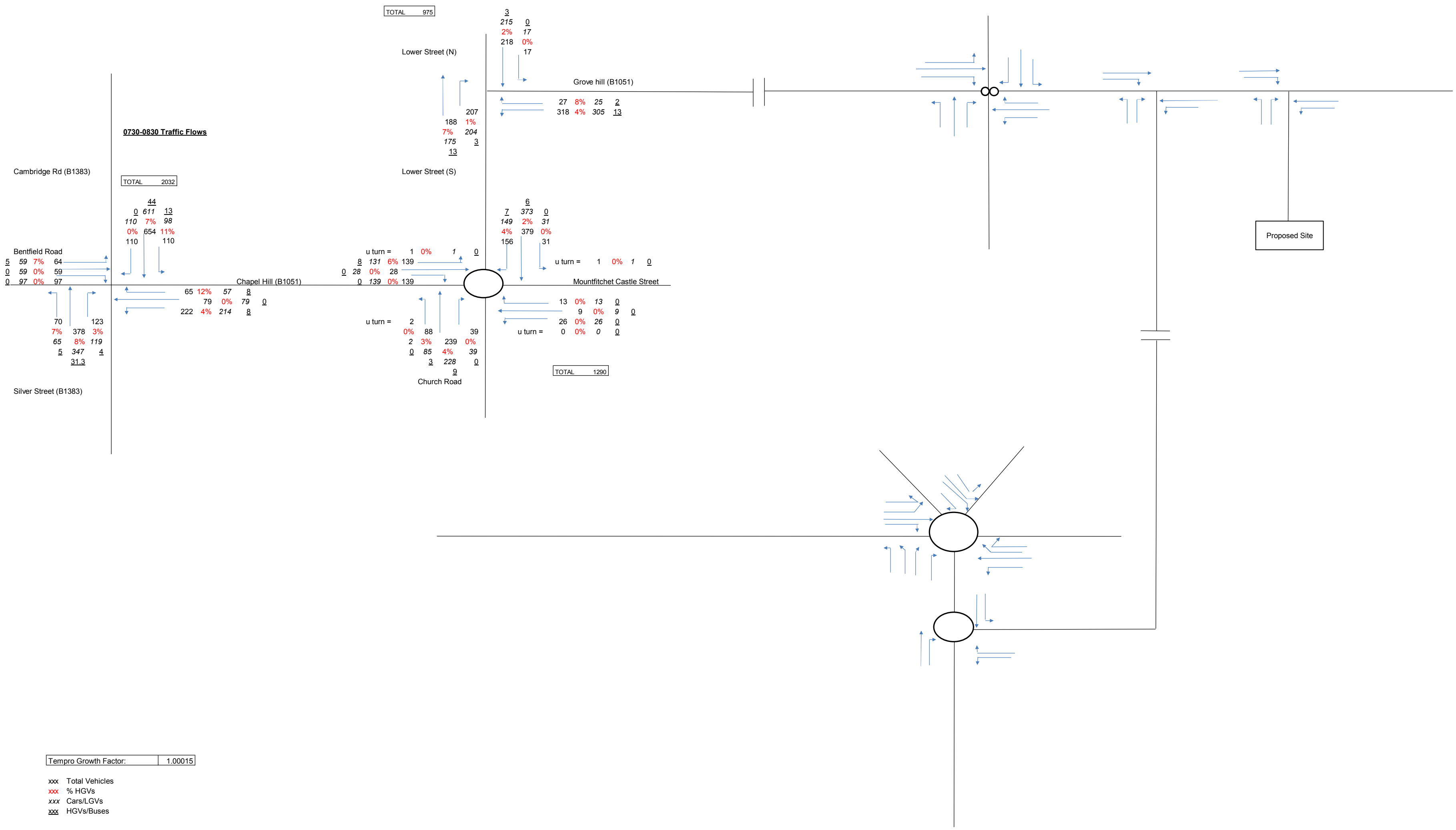
52-56 Leadenhall Street
London EC3M 5JE

Client	Project
Countryside	**Land South of Henham Road, Elsenham**

Date	Job No	Drawing No
July 2022	**2008170**	

2027 Base (using 2022 survey flows + Tempro Growth committed dev) + Development Flows - AM Peak



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Third Floor, The Hallmark Building
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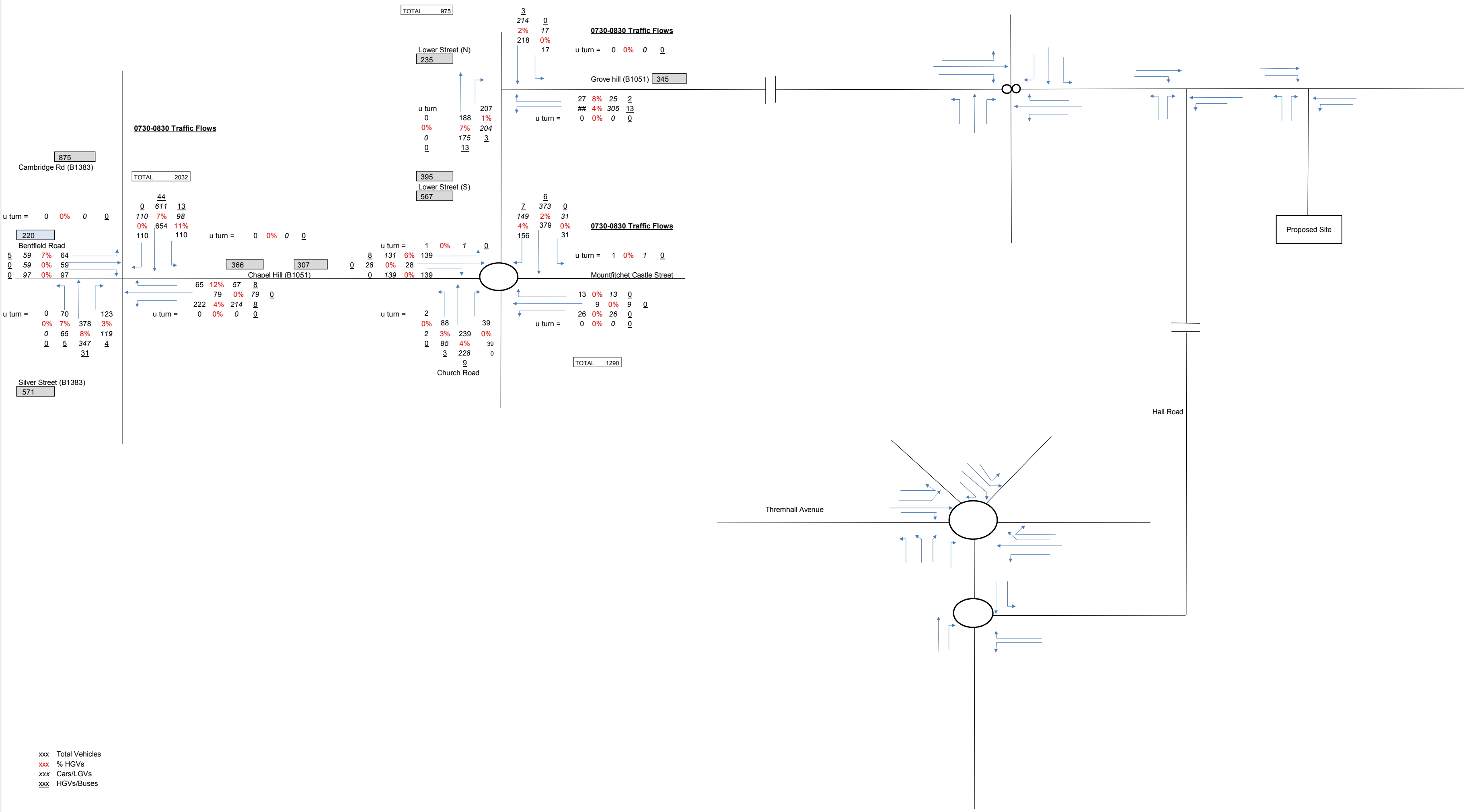
London EC3M 5JE

Client	Project
Countryside	**Land South of Henham Road, Elsenham**

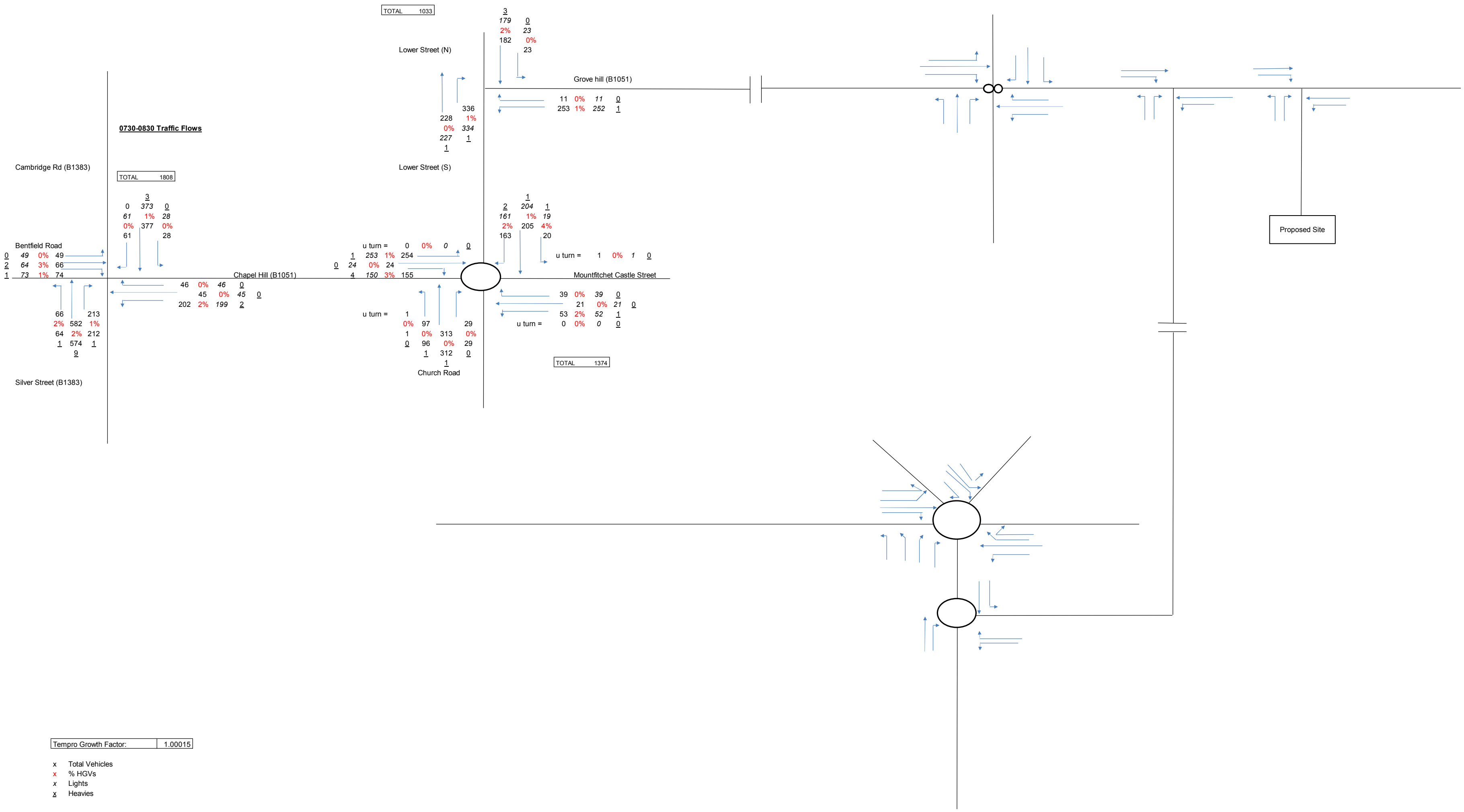
Date	Job No	Drawing No
July 2022	**2008170**	

2027 Background Flows (using 2022 survey flows + Tempro Growth) - AM Peak



ARDENT CONSULTING ENGINEERS Third Floor, The Hallmark Building 52-56 Leadenhall Street London EC3M 5JE	Client **Countryside**	Project **Land South of Henham Road, Elsenham**
	Date **July 2022**	Job No **2008170**
	Drawing No	

Alternative 2022 Surveyed Flows - AM Peak (0730-0830) - for Vissim Model in Stansted Mountfitchet



Tempro Growth Factor:	1.00015

x Total Vehicles
x % HGVs
x Lights
x Heavies

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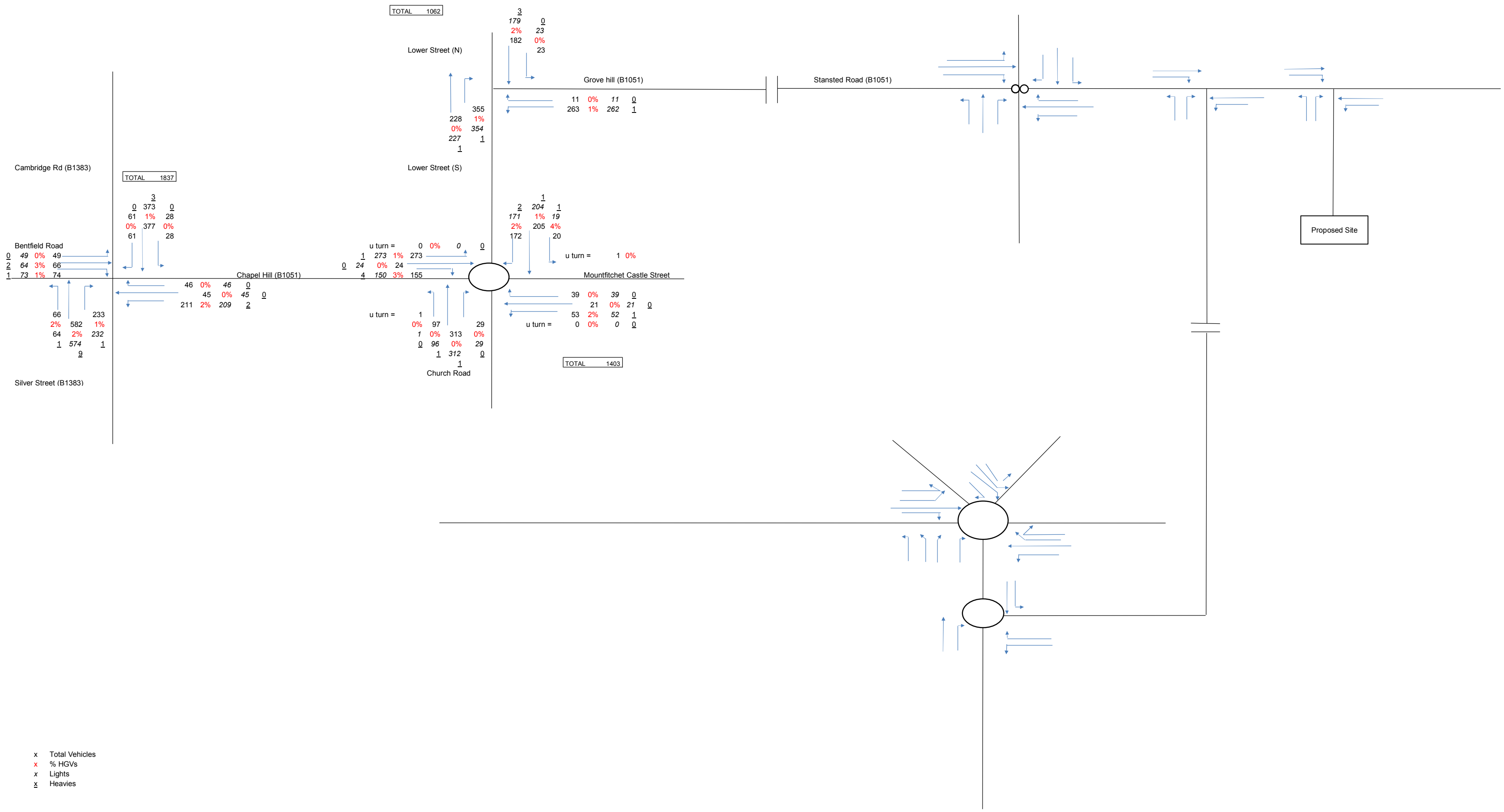
London EC3M 5JE

Client	Project
Countryside	**Land South of Henham Road, Elsenham**

Date	Job No	Drawing No
July 2022	**2008170**	

2027 Base Flows (using 2022 survey flows + Tempro Growth + Committed Dev) - PM Peak



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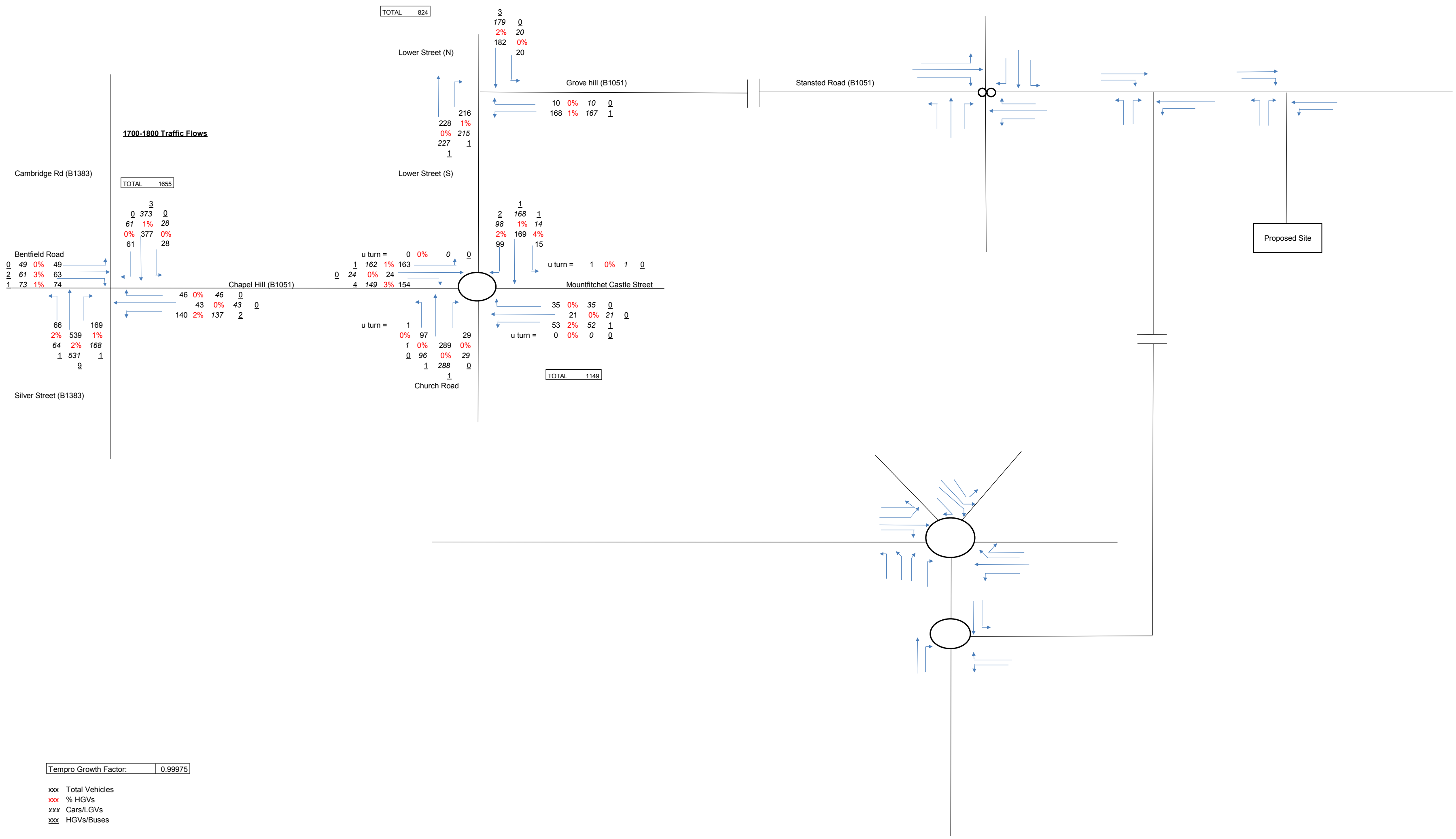
London EC3M 5JE

Client	Project
Countryside	**Land South of Henham Road, Elsenham**

Date	Job No	Drawing No
July 2022	**2008170**	

2027 Base (using 2022 survey flows + committed dev) + Development Flows - PM Peak



Tempro Growth Factor:	0.99975

xxx Total Vehicles
xxx % HGVs
xxx Cars/LGVs
<u>xxx</u> HGVs/Buses

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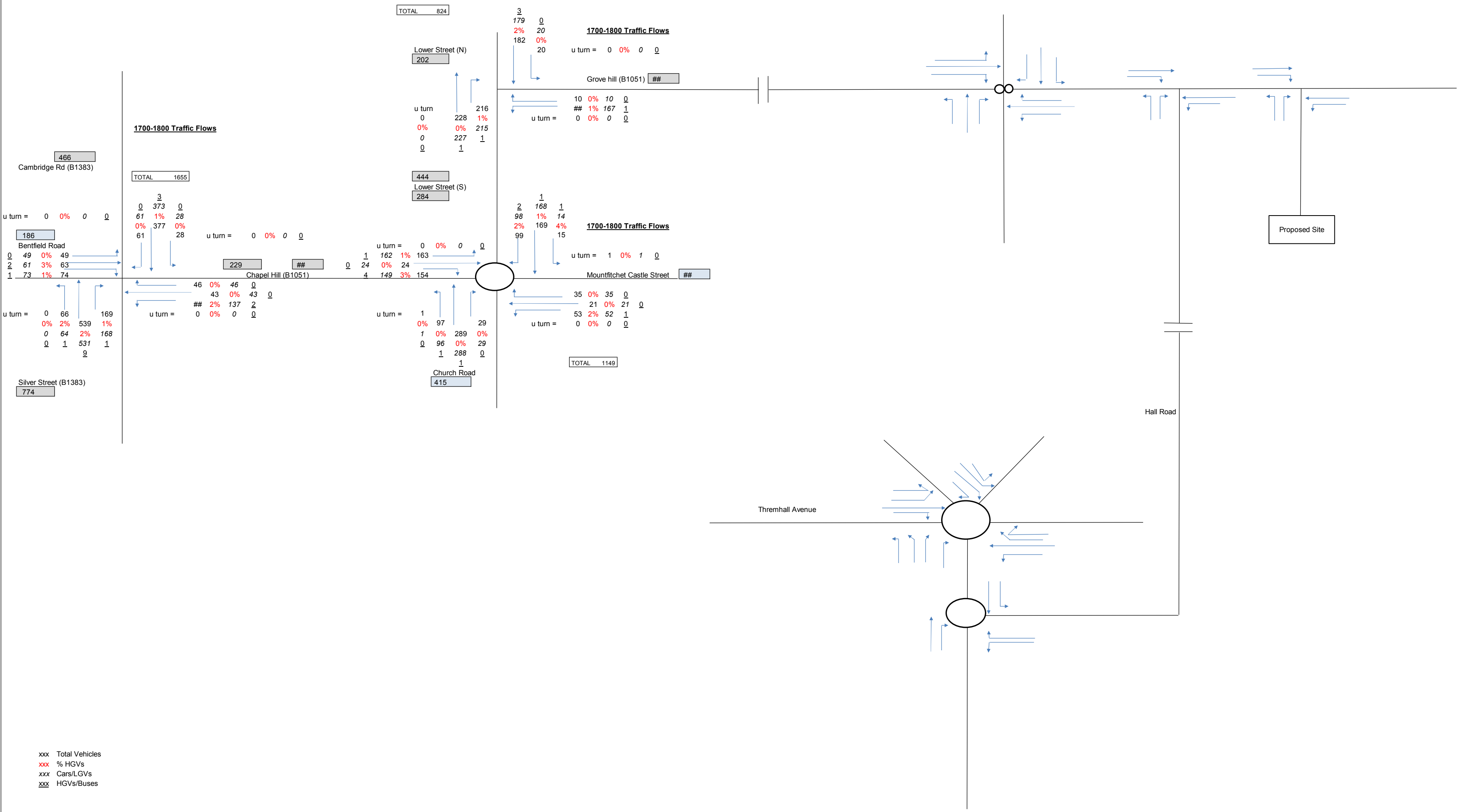
52-56 Leadenhall Street
London EC3M 5JE

Client	Project
Countryside	**Land South of Henham Road, Elsenham**

Date	Job No	Drawing No
July 2022	**2008170**	

2027 Background Flows (using 2022 survey flows + Tempro Growth) - PM Peak



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London EC3M 5JE

Client	Project
Countryside	**Land South of Henham Road, Elsenham**

Date	Job No	Drawing No
July 2022	**2008170**	

Alternative 2022 Surveyed Flows - PM Peak (1700-1800) - for Vissim Model in Stansted Mountfitchet

COMPARISON OF TURNING PROPORTIONS FOR USE IN ALTERNATIVE RUN OF VISSIM MODEL - TOTAL FLOWS DURING PEAKS

2022 Surveys	Grove Hill Traffic Signals				Castle Roundabout					Silver Hill Crossroads				
(0730-0830)	Lower St N	Grove Hill	Lower St S		Lower St	MF Castle St	Church Rd	Chapel Hill		Chapel Hill	Silver Hill Rd	Bentfield Rd	Cambridge Rd	
AM Peak														
Lower St N	0	17	391	408										
Grove Hill	13	0	312	325										
Lower St S	357	160	0	517										
Lower St					3	20	372	311	706					
MF Castle St					13	0	26	9	48					
Church Road					239	39	2	88	368					
Chapel Hill					266	22	87	2	377					
Chapel Hill										0	339	37	25	401
Silver Hill Rd										237	0	82	157	476
Bentfield Rd										43	149	0	28	220
Cambridge Rd										96	135	32	0	263

2022 Surveys	Grove Hill Traffic Signals				Castle Roundabout					Silver Hill Crossroads				
(1700-1800)	Lower St N	Grove Hill	Lower St S		Lower St	MF Castle St	Church Rd	Chapel Hill		Chapel Hill	Silver Hill Rd	Bentfield Rd	Cambridge Rd	
PM Peak														
Lower St N	0	26	304	330										
Grove Hill	16	0	169	185										
Lower St S	385	307	1	693										
Lower St					6	26	265	188	485					
MF Castle St					43	0	52	14	109					
Church Road					306	45	0	64	415					
Chapel Hill					333	24	69	0	426					
Chapel Hill										0	236	32	32	300
Silver Hill Rd										321	0	132	189	642
Bentfield Rd										35	132	0	19	186
Cambridge Rd										73	110	42	0	225

Flows taken from diagrams in TA for Land E of Elsenham

2017 Surveys	Grove Hill Traffic Signals				Castle Roundabout					Silver Hill Crossroads				
(0800-0900)	Lower St N	Grove Hill	Lower St S		Lower St	MF Castle St	Church Rd	Chapel Hill		Chapel Hill	Silver Hill Rd	Bentfield Rd	Cambridge Rd	
AM Peak														
Lower St N	0	16	203	219										
Grove Hill	21	0	246	267										
Lower St S	149	164	0	313										
Lower St					1	24	295	121	441					
MF Castle St					13	0	15	13	41					
Church Road					204	30	1	101	336					
Chapel Hill					96	19	96	1	212					
Chapel Hill										0	140	50	41	231
Silver Hill Rd										120	0	68	369	557
Bentfield Rd										41	67	0	44	152
Cambridge Rd										82	486	82	0	650

Flows taken from diagrams in TA for Land E of Elsenham

2017 Surveys	Grove Hill Traffic Signals				Castle Roundabout					Silver Hill Crossroads				
(1700-1800)	Lower St N	Grove Hill	Lower St S		Lower St	MF Castle St	Church Rd	Chapel Hill		Chapel Hill	Silver Hill Rd	Bentfield Rd	Cambridge Rd	
PM Peak														
Lower St N	0	12	110	122										
Grove Hill	10	0	163	173										
Lower St S	252	239	0	491										
Lower St					1	14	162	95	272					
MF Castle St					28	0	42	17	87					
Church Road					331	33	1	111	476					
Chapel Hill					107	16	101	0	224					
Chapel Hill										0	127	39	42	208
Silver Hill Rd										124	0	48	395	567
Bentfield Rd										35	41	0	27	103
Cambridge Rd										34	457	74	0	565

Flows taken from diagrams in W of Hall Road TA

2018 Surveys	Grove Hill Traffic Signals				Castle Roundabout					Silver Hill Crossroads				
(0730-0830)	Lower St N	Grove Hill	Lower St S		Lower St	MF Castle St	Church Rd	Chapel Hill		Chapel Hill	Silver Hill Rd	Bentfield Rd	Cambridge Rd	
AM Peak														
Lower St N	0	14	172	186										
Grove Hill	9	0	265	274										
Lower St S	162	193	0	355										
Lower St					1	22	236	175	434					
MF Castle St					14	0	17	11	42					
Church Road					196	34	1	78	309					
Chapel Hill					148	24	111	0	283					
Chapel Hill										0	198	40	28	266
Silver Hill Rd										152	0	40	459	651
Bentfield Rd										57	55	0	34	146
Cambridge Rd										64	563	21	0	648

Flows taken from diagrams in W of Hall Road TA

2018 Surveys	Grove Hill Traffic Signals				Castle Roundabout					Silver Hill Crossroads				
(1700-1800)	Lower St N	Grove Hill	Lower St S		Lower St	MF Castle St	Church Rd	Chapel Hill		Chapel Hill	Silver Hill Rd	Bentfield Rd	Cambridge Rd	
PM Peak														
Lower St N	0	15	135	150										
Grove Hill	13	0	151	164										
Lower St S	217	290	0	507										
Lower St					4	26	157	100	287					
MF Castle St					44	0	44	31	119					
Church Road					250	37	0	89	376					
Chapel Hill					204	33	84	1	322					
Chapel Hill										0	135	35	31	201
Silver Hill Rd										232	0	57	533	822
Bentfield Rd										34	35	0	21	90
Cambridge Rd										71	451	21	0	543

%s FOR EACH JUNCTION

2022 Surveys	Grove Hill Traffic Signals				Castle Roundabout					Silver Hill Crossroads				
	Lower St N	Grove Hill	Lower St S		Lower St	MF Castle St	Church Rd	Chapel Hill		Chapel Hill	Silver Hill Rd	Bentfield Rd	Cambridge Rd	
AM Peak														
Lower St N	0%	4%	96%	100%										
Grove Hill	4%	0%	96%	100%										
Lower St S	69%	31%	0%	100%										
Lower St					0%	3%	53%	44%	100%					
MF Castle St					27%	0%	54%	19%	100%					
Church Road					65%	11%	1%	24%	100%					
Chapel Hill					71%	6%	23%	1%	100%					
Chapel Hill										0%	85%	9%	6%	100%
Silver Hill Rd										50%	0%	17%	33%	100%
Bentfield Rd										20%	68%	0%	13%	100%
Cambridge Rd										37%	51%	12%	0%	100%

2022 Surveys	Grove Hill Traffic Signals				Castle Roundabout					Silver Hill Crossroads				
(1700-1800)	Lower St N	Grove Hill	Lower St S		Lower St	MF Castle St	Church Rd	Chapel Hill		Chapel Hill	Silver Hill Rd	Bentfield Rd	Cambridge Rd	
PM Peak														
Lower St N	0%	8%	92%											
Grove Hill	9%	0%	91%											
Lower St S	56%	44%	0%											
Lower St					1%	5%	55%	39%	100%					
MF Castle St					39%	0%	48%	13%	100%					
Church Road					74%	11%	0%	15%	100%					
Chapel Hill					78%	6%	16%	0%	100%					
Chapel Hill										0%	79%	11%	11%	100%
Silver Hill Rd										50%	0%	21%	29%	100%
Bentfield Rd										19%	71%	0%	10%	100%
Cambridge Rd										32%	49%	19%	0%	100%

Flows taken from diagrams in TA for Land E of Elsenham

2017 Surveys	Grove Hill Traffic Signals				Castle Roundabout					Silver Hill Crossroads				
(unknown)	Lower St N	Grove Hill	Lower St S		Lower St	MF Castle St	Church Rd	Chapel Hill		Chapel Hill	Silver Hill Rd	Bentfield Rd	Cambridge Rd	
AM Peak														
Lower St N	0%	7%	93%	100%										
Grove Hill	8%	0%	92%	100%										
Lower St S	48%	52%	0%	100%										
Lower St					0%	5%	67%	27%	100%					
MF Castle St					32%	0%	37%	32%	100%					
Church Road					61%	9%	0%	30%	100%					
Chapel Hill					45%	9%	45%	0%	100%					
Chapel Hill		`								0%	61%	22%	18%	100%
Silver Hill Rd										22%	0%	12%	66%	100%
Bentfield Rd										27%	44%	0%	29%	100%
Cambridge Rd										13%	75%	13%	0%	100%

Flows taken from diagrams in TA for Land E of Elsenham

2017 Surveys	Grove Hill Traffic Signals				Castle Roundabout					Silver Hill Crossroads				
(1700-1800)	Lower St N	Grove Hill	Lower St S		Lower St	MF Castle St	Church Rd	Chapel Hill		Chapel Hill	Silver Hill Rd	Bentfield Rd	Cambridge Rd	
PM Peak														
Lower St N	0%	10%	90%	100%										
Grove Hill	6%	0%	94%	100%										
Lower St S	51%	49%	0%	100%										
Lower St					0%	5%	60%	35%	100%					
MF Castle St					32%	0%	48%	20%	100%					
Church Road					70%	7%	0%	23%	100%					
Chapel Hill					48%	7%	45%	0%	100%					
Chapel Hill										0%	61%	19%	20%	100%
Silver Hill Rd										22%	0%	8%	70%	100%
Bentfield Rd										34%	40%	0%	26%	100%
Cambridge Rd										6%	81%	13%	0%	100%

Flows taken from diagrams in W of Hall Road TA

2018 Surveys	Grove Hill Traffic Signals				Castle Roundabout					Silver Hill Crossroads				
(0730-0830)	Lower St N	Grove Hill	Lower St S		Lower St	MF Castle St	Church Rd	Chapel Hill		Chapel Hill	Silver Hill Rd	Bentfield Rd	Cambridge Rd	
AM Peak														
Lower St N	0%	8%	92%	100%										
Grove Hill	3%	0%	97%	100%										
Lower St S	46%	54%	0%	100%										
Lower St					0%	5%	54%	40%	100%					
MF Castle St					33%	0%	40%	26%	100%					
Church Road					63%	11%	0%	25%	100%					
Chapel Hill					52%	8%	39%	0%	100%					
Chapel Hill										0%	74%	15%	11%	100%
Silver Hill Rd										23%	0%	6%	71%	100%
Bentfield Rd										39%	38%	0%	23%	100%
Cambridge Rd										10%	87%	3%	0%	100%

Flows taken from diagrams in W of Hall Road TA

2018 Surveys	Grove Hill Traffic Signals				Castle Roundabout					Silver Hill Crossroads				
(1700-1800)	Lower St N	Grove Hill	Lower St S		Lower St	MF Castle St	Church Rd	Chapel Hill		Chapel Hill	Silver Hill Rd	Bentfield Rd	Cambridge Rd	
PM Peak														
Lower St N	0%	10%	90%	100%										
Grove Hill	8%	0%	92%	100%										
Lower St S	43%	57%	0%	100%										
Lower St					1%	9%	55%	35%	100%					
MF Castle St					37%	0%	37%	26%	100%					
Church Road					66%	10%	0%	24%	100%					
Chapel Hill					63%	10%	26%	0%	100%					
Chapel Hill										0%	67%	17%	15%	100%
Silver Hill Rd										28%	0%	7%	65%	100%
Bentfield Rd										38%	39%	0%	23%	100%
Cambridge Rd										13%	83%	4%	0%	100%

ATC May 2022 (Tues 10th May - Mon 16th May 2022

Links	0700-0800			0800-0900			0700-0900				FACTOR 0730-0830 over 2 hrs				0730-0830		
	NB/EB	**SB/WB**	***Two Way***	**NB/EB**	**SB/WB**	***Two Way***	**NB/EB**	**SB/WB**	***Two Way***		**NB/EB**	**SB/WB**	***Two Way***		**NB/EB**	**SB/WB**	***Two Way***
Silver Street	402	623	*1025*	513	601	*1114*	915	1224	2139		0.52	0.51	0.51				
Cambridge Road	115	157	*272*	129	156	*285*	244	313	557		0.86	0.84	0.85				
Chapel Hill											0.69	0.68	0.68				
Lower St (S)											0.66	0.71	0.69				
**Lower Street (N)	255	296	*551*	302	277	*579*	557	573	1130		0.66	0.71	0.69				
Grove Hill	137	272	*409*	196	263	*459*	333	535	868		0.53	0.61	0.58				
Bentfield Road											No factors applied - use original flows						
Church Road											No factors applied - use original flows						
Mountfitchet Castle Street											No factors applied - use original flows						

MTC Tues 10th May 2022

Links	0700-0800			0800-0900			0700-0900								0730-0830		
	NB/EB	**SB/WB**	***Two Way***	**NB/EB**	**SB/WB**	***Two Way***	**NB/EB**	**SB/WB**	***Two Way***						**NB/EB**	**SB/WB**	***Two Way***
Silver Street	405	588	*993*	519	555	*1074*	924	1143	2067						476	623	*1099*
Cambridge Road	204	220	*424*	203	228	*431*	407	448	855						210	263	*473*
B1051 (Chapel Hill)	326	412	*738*	397	362	*759*	723	774	1497						376	401	*777*
Lower Street (S)	426	685	*1111*	540	652	*1192*	966	1337	2303						519	705	*1224*
Lower Street (N)	284	420	*704*	370	394	*764*	654	814	1468						370	408	*778*
Grove Hill	164	287	*451*	206	294	*500*	370	581	951						177	325	*502*

Appendix M

Journey Times by Section

AM Peak 07:30 to 08:30

Route	Direction	Description			Future Base Travel Time				Future Base + Dev Travel Time				AVG DIFF.		Future Base + Mit Travel Time				Future Base + Dev + Mit Travel Time				AVG DIFF.	
					Min	Avg	Max	St Dev	Min	Avg	Max	St Dev	Diff.	% Diff.	Min	Avg	Max	St Dev	Min	Avg	Max	St Dev	Diff.	% Diff.
101	WB\SB	B1051 (100m east of Raven Cottage)	-	B1051 / Lower St	579	636	683	30	604	646	691	25	10	2%	540	589	643	32	531	559	613	21	-30	-5%
102	WB\SB	B1051 / Lower St	-	Lower Hill / Chapel Hill R'bout	26	29	32	1	28	29	33	2	1	2%	27	34	60	8	29	34	50	5	0	-1%
103	WB\SB	Lower Hill / Chapel Hill R'bout	-	Chapel Hill / Cambridge Rd	102	125	147	12	110	129	151	13	4	3%	100	115	137	9	115	131	147	10	17	15%
104	WB\SB	Chapel Hill / Cambridge Rd	-	Silver St / Sanders Cl	20	20	21	0	20	20	21	0	0	0%	20	20	21	0	20	20	21	0	0	0%
	WB\SB	B1051 (100m east of Raven Cottage)	-	Silver St / Sanders Cl	728	809	882		762	824	895		15	2%	687	758	860		694	745	830		-13	-2%
201	NB\EB	Silver St / Sanders Cl	-	Chapel Hill / Cambridge Rd	38	45	55	5	38	44	53	4	-1	-1%	38	46	58	6	40	47	62	6	1	2%
202	NB\EB	Chapel Hill / Cambridge Rd	-	Lower Hill / Chapel Hill R'bout	81	100	122	9	88	107	123	11	7	7%	89	103	144	12	90	109	136	15	7	6%
203	NB\EB	Lower Hill / Chapel Hill R'bout	-	B1051 / Lower St	29	31	34	1	30	32	36	2	0	1%	56	65	79	6	45	55	66	5	-10	-16%
204	NB\EB	B1051 / Lower St	-	B1051 (100m east of Raven Cottage)	53	55	57	1	53	55	57	1	0	0%	55	57	59	1	58	60	61	1	3	4%
	NB\EB	Silver St / Sanders Cl	-	B1051 (100m east of Raven Cottage)	202	231	268		208	238	270		7	3%	238	271	340		233	270	326		0	0%

Journey Times by Section

Route	Direction	Description			Future Base				Future Base + Dev				AVG DIFF.		Future Base + Mit				Future Base + Dev + Mit				AVG DIFF.	
					Travel Time				Travel Time						Travel Time				Travel Time					
PM Peak 17:00 to 18:00					Min	Avg	Max	St Dev	Min	Avg	Max	St Dev	Diff.	% Diff.	Min	Avg	Max	St Dev	Min	Avg	Max	St Dev	Diff.	% Diff.
101	WB\SB	B1051 (100m east of Raven Cottage)	-	B1051 / Lower St	193	284	466	75	284	418	613	90	134	47%	120	170	229	30	127	193	262	41	23	14%
102	WB\SB	B1051 / Lower St	-	Lower Hill / Chapel Hill R'bout	34	45	62	8	39	46	54	4	1	1%	41	53	77	9	49	62	77	7	9	18%
103	WB\SB	Lower Hill / Chapel Hill R'bout	-	Chapel Hill / Cambridge Rd	157	189	220	13	172	188	203	8	-2	-1%	173	190	204	9	158	179	198	12	-11	-6%
104	WB\SB	Chapel Hill / Cambridge Rd	-	Silver St / Sanders Cl	19	20	20	0	19	20	20	0	0	0%	19	20	20	0	19	20	20	0	0	0%
	WB\SB	B1051 (100m east of Raven Cottage)	-	Silver St / Sanders Cl	403	538	768		515	671	890		133	25%	352	432	530		353	453	557		22	5%
201	NB\EB	Silver St / Sanders Cl	-	Chapel Hill / Cambridge Rd	32	46	67	9	38	49	66	8	3	6%	37	48	72	10	41	54	77	10	6	12%
202	NB\EB	Chapel Hill / Cambridge Rd	-	Lower Hill / Chapel Hill R'bout	189	227	270	22	211	228	247	10	1	1%	214	238	271	16	220	243	266	12	5	2%
203	NB\EB	Lower Hill / Chapel Hill R'bout	-	B1051 / Lower St	30	31	33	1	30	32	34	1	1	2%	39	43	48	2	43	46	49	1	2	5%
204	NB\EB	B1051 / Lower St	-	B1051 (100m east of Raven Cottage)	53	55	57	1	53	54	56	1	0	-1%	53	58	62	2	57	60	63	2	2	3%
	NB\EB	Silver St / Sanders Cl	-	B1051 (100m east of Raven Cottage)	303	359	426		331	363	403		5	1%	344	388	452		359	403	456		15	4%

Appendix N

Junctions 10

ARCADY 10 - Roundabout Module

Version: 10.0.2.1574

For sales and distribution information, program advice and maintenance, contact TRL Software:
+44 (0)1344 379777 software@trl.co.uk [redacted]

The users of this computer program for the solution of an engineering problem are in no way relieved of their responsibility for the correctness of the solution

Filename: Coopers End Parsonage Linked Roundabouts (Improvements).j10
Path: Y:\ARDENT PROJECTS\2008170 - Land South of Henham Road, Elsenham\Transport\ARCADY
Report generation date: 28/07/2022 16:09:19

»Alternate Sensitivity Scenario (Development Case), AM
»Alternate Sensitivity Scenario (Development Case), PM

Summary of junction performance

	AM		PM	
	Q (PCU)	RFC	Q (PCU)	RFC
	Alternate Sensitivity Scenario (Development Case)			
Junction 3 - Arm 1	0.4	0.25	0.9	0.46
Junction 3 - Arm 2	2.8	0.74	2.9	0.75
Junction 3 - Arm 3	0.9	0.47	1.7	0.62
Junction 3 - Arm 4	0.3	0.21	0.4	0.29
Junction 4 - Arm 1	2.2	0.68	1.9	0.65
Junction 4 - Arm 2	1.1	0.50	0.6	0.37
Junction 4 - Arm 3	1.7	0.64	12.3	0.96

There are warnings associated with one or more model runs - see the 'Data Errors and Warnings' tables for each Analysis or Demand Set.

Values shown are the highest values encountered over all time segments. Delay is the maximum value of Av. delay per arriving vehicle.

File summary

File Description

Title	
Location	
Site number	
Date	17/03/2022
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Enumerator	ARDENTCE\jsymington
Description	

Units

Distance units	Speed units	Traffic units input	Traffic units results	Flow units	Av. delay units	Total delay units	Rate of delay units
m	kph	PCU	PCU	perHour	s	-Min	perMin

Analysis Options

Mini-roundabout model	Vehicle length (m)	Calculate Q Percentiles	Calculate detailed queueing delay	Show lane queues in feet / metres	Show all PICADY stream intercepts	Calculate residual capacity	RFC Threshold	Av. Delay threshold (s)	Q threshold (PCU)	Use iterations with HCM roundabouts	Max number of iterations for roundabouts
JUNCTIONS 9	5.75						0.85	36.00	20.00		500

Demand Set Summary

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D1	Alternate Sensitivity Scenario (Development Case)	AM	ONE HOUR	07:30	09:00	15	✓
D2	Alternate Sensitivity Scenario (Development Case)	PM	ONE HOUR	16:45	18:15	15	✓

Analysis Set Details

ID	Include in report	Network flow scaling factor (%)	Network capacity scaling factor (%)
A1	✓	100.000	100.000

Alternate Sensitivity Scenario (Development Case), AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Linked Roundabout	Junction 3 - Arm 2	If the distance between linked junctions is small, results should be treated with caution. The linked junctions will be modelled as separate junctions, but the real behaviour may be that of a complex system with interactions that cannot be modelled.
Warning	Linked roundabouts	Junction 3	U-turns on linked arms may cause sporadic locking up of junctions and/or unreliable results.
Warning	Linked Roundabout	Junction 4 - Arm 3	If the distance between linked junctions is small, results should be treated with caution. The linked junctions will be modelled as separate junctions, but the real behaviour may be that of a complex system with interactions that cannot be modelled.
Warning	Linked roundabouts	Junction 4	U-turns on linked arms may cause sporadic locking up of junctions and/or unreliable results.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
3	Coopers End Roundabout	Standard Roundabout		1, 2, 3, 4, 5	7.00	A
4	Parsonage Road	Mini-roundabout		1, 2, 3	13.13	B

Junction Network

Driving side	Lighting	Road surface	In London	Network delay (s)	Network LOS
Left	Normal/unknown	Normal/unknown		9.33	A

Arms

Arms

Junction	Arm	Name	Description	No give-way line
3	1	Terminal Road South		
	2	Link		
	3	Thremhall Avenue		
	4	Coopers End Road		
	5	Terminal Road North		
4	1	Parsonage Road North		
	2	Parsonage Road South		
	3	Link		

Roundabout Geometry

Junction	Arm	V (m)	E (m)	l' (m)	R (m)	D (m)	PHI (deg)	Entry only	Exit only
3	1	7.35	10.06	11.2	50.1	90.4	43.3		
	2	3.34	6.50	5.0	14.5	90.4	77.0		
	3	4.36	7.10	19.8	154.3	90.4	48.0		
	4	3.70	6.93	18.9	30.0	90.4	50.5		
	5								✓

Mini Roundabout Geometry

Junction	Arm	Approach road half-width (m)	Minimum approach road half-width (m)	Entry width (m)	Effective flare length (m)	Distance to next arm (m)	Entry corner kerb line distance (m)	Gradient over 50m (%)	Kerbed central island
4	1	2.69	2.69	4.28	4.7	19.92	17.88	0.0	
	2	2.48	2.48	3.91	7.8	19.93	18.95	0.0	
	3	3.56	3.04	4.50	7.2	14.79	9.21	0.0	

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Junction	Arm	Final slope	Final intercept (PCU/hr)
3	1	0.586	2645
	2	0.330	1087
	3	0.474	1859
	4	0.438	1657
	5		
4	1	0.712	931
	2	0.784	1175
	3	0.627	792

The slope and intercept shown above include any corrections and adjustments.

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D1	Alternate Sensitivity Scenario (Development Case)	AM	ONE HOUR	07:30	09:00	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Linked Arm Data

Junction	Arm	Feeding Junction	Feeding Arm	Link Type	Flow source	Uniform flow (PCU/hr)	Flow multiplier (%)	Internal storage space (PCU)
3	2	4	3	Simple (vertical queueing)	Normal	0	100.00	
4	3	3	2	Simple (vertical queueing)	Normal	0	100.00	

Demand overview (Traffic)

Junction	Arm	Linked arm	Profile type	Use O-D data	Av. Demand (PCU/hr)	Scaling Factor (%)
3	1		ONE HOUR	✓	537	100.000
	2	✓				
	3		ONE HOUR	✓	712	100.000
	4		ONE HOUR	✓	239	100.000
	5					
4	1		ONE HOUR	✓	494	100.000
	2		ONE HOUR	✓	393	100.000
	3	✓				

Origin-Destination Data

Demand (PCU/hr)

Junction 3

		To				
		1	2	3	4	5
From	1	1	60	386	72	18
	2	43	1	348	181	32
	3	223	266	2	11	210
	4	78	71	14	26	50
	5	0	0	0	0	0

Demand (PCU/hr)

Junction 4

		To		
		1	2	3
From	1	15	129	350
	2	141	1	251
	3	228	166	2

Vehicle Mix

HV %s

Junction 3

		To				
		1	2	3	4	5
From	1	0	7	7	15	0
	2	0	0	4	0	0
	3	10	5	0	9	3
	4	14	9	29	88	20
	5	0	0	0	0	0

HV %s

Junction 4

		To		
		1	2	3
From	1	0	12	4
	2	22	0	5
	3	0	0	0

Results

Results Summary for whole modelled period

Junction	Arm	Max RFC	Max Delay (s)	Max Q (PCU)	Max LOS	Av. Demand (PCU/hr)	Total Junction Arrivals (PCU)
3	1	0.25	2.14	0.4	A	493	739
	2	0.74	15.55	2.8	C	553	829
	3	0.47	4.33	0.9	A	653	980
	4	0.21	4.26	0.3	A	219	329
	5						
4	1	0.68	14.95	2.2	B	453	680
	2	0.50	9.34	1.1	A	361	541
	3	0.64	14.62	1.7	B	365	548

Main Results for each time segment

07:30 - 07:45

Junction	Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
3	1	404	101	285	2478	0.163	403	258	0.0	0.2	1.869	A
	2	450	113	390	959	0.470	447	299	0.0	0.9	7.143	A
	3	536	134	278	1727	0.310	534	559	0.0	0.5	3.191	A
	4	180	45	596	1396	0.129	179	216	0.0	0.2	3.535	A
	5			543				232				
4	1	372	93	126	841	0.442	369	287	0.0	0.8	8.009	A
	2	296	74	274	960	0.308	294	221	0.0	0.5	5.954	A
	3	299	75	117	719	0.416	296	450	0.0	0.7	8.462	A

07:45 - 08:00

Junction	Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
3	1	483	121	341	2445	0.197	483	310	0.2	0.3	1.976	A
	2	540	135	466	934	0.579	539	357	0.9	1.4	9.273	A
	3	640	160	334	1700	0.376	639	671	0.5	0.6	3.593	A
	4	215	54	714	1344	0.160	215	259	0.2	0.2	3.809	A
	5			651				278				
4	1	444	111	152	823	0.540	443	345	0.8	1.2	9.976	A
	2	353	88	329	917	0.385	353	266	0.5	0.7	7.035	A
	3	357	89	141	704	0.508	356	540	0.7	1.0	10.317	B

08:00 - 08:15

Junction	Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
3	1	591	148	418	2400	0.246	591	379	0.3	0.4	2.143	A
	2	660	165	571	899	0.734	655	438	1.4	2.7	14.775	B
	3	784	196	407	1666	0.471	783	819	0.6	0.9	4.314	A
	4	263	66	874	1275	0.206	263	316	0.2	0.3	4.253	A
	5			796				340				
4	1	544	136	186	799	0.681	540	421	1.2	2.2	14.508	B
	2	433	108	401	860	0.503	431	324	0.7	1.1	9.232	A
	3	438	109	172	684	0.640	435	660	1.0	1.7	14.273	B

08:15 - 08:30

Junction	Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
3	1	591	148	418	2400	0.246	591	380	0.4	0.4	2.144	A
	2	664	166	571	899	0.738	663	438	2.7	2.8	15.554	C
	3	784	196	411	1664	0.471	784	824	0.9	0.9	4.332	A
	4	263	66	876	1274	0.207	263	318	0.3	0.3	4.259	A
	5			798				341				
4	1	544	136	187	798	0.682	544	424	2.2	2.2	14.947	B
	2	433	108	404	858	0.504	433	327	1.1	1.1	9.344	A
	3	438	110	173	684	0.641	438	664	1.7	1.7	14.624	B

08:30 - 08:45

Junction	Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
3	1	483	121	342	2445	0.197	483	311	0.4	0.3	1.977	A
	2	546	136	467	933	0.585	551	358	2.8	1.5	9.755	A
	3	640	160	339	1698	0.377	641	679	0.9	0.6	3.615	A
	4	215	54	718	1343	0.160	215	263	0.3	0.2	3.816	A
	5			653				279				
4	1	444	111	154	821	0.541	448	349	2.2	1.3	10.300	B
	2	353	88	333	914	0.387	355	269	1.1	0.7	7.137	A
	3	358	90	142	703	0.510	361	546	1.7	1.1	10.605	B

08:45 - 09:00

Junction	Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
3	1	404	101	286	2477	0.163	405	260	0.3	0.2	1.873	A
	2	456	114	391	958	0.475	458	300	1.5	0.9	7.384	A
	3	536	134	283	1725	0.311	537	566	0.6	0.5	3.211	A
	4	180	45	600	1394	0.129	180	219	0.2	0.2	3.546	A
	5			547				234				
4	1	372	93	129	840	0.443	374	291	1.3	0.9	8.206	A
	2	296	74	278	957	0.309	297	225	0.7	0.5	6.031	A
	3	300	75	119	718	0.418	301	456	1.1	0.7	8.671	A

Alternate Sensitivity Scenario (Development Case), PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Linked Roundabout	Junction 3 - Arm 2	If the distance between linked junctions is small, results should be treated with caution. The linked junctions will be modelled as separate junctions, but the real behaviour may be that of a complex system with interactions that cannot be modelled.
Warning	Linked roundabouts	Junction 3	U-turns on linked arms may cause sporadic locking up of junctions and/or unreliable results.
Warning	Linked Roundabout	Junction 4 - Arm 3	If the distance between linked junctions is small, results should be treated with caution. The linked junctions will be modelled as separate junctions, but the real behaviour may be that of a complex system with interactions that cannot be modelled.
Warning	Linked roundabouts	Junction 4	U-turns on linked arms may cause sporadic locking up of junctions and/or unreliable results.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
3	Coopers End Roundabout	Standard Roundabout		1, 2, 3, 4, 5	7.20	A
4	Parsonage Road	Mini-roundabout		1, 2, 3	37.20	E

Junction Network

Driving side	Lighting	Road surface	In London	Network delay (s)	Network LOS
Left	Normal/unknown	Normal/unknown		17.15	C

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D2	Alternate Sensitivity Scenario (Development Case)	PM	ONE HOUR	16:45	18:15	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Linked Arm Data

Junction	Arm	Feeding Junction	Feeding Arm	Link Type	Flow source	Uniform flow (PCU/hr)	Flow multiplier (%)	Internal storage space (PCU)
3	2	4	3	Simple (vertical queueing)	Normal	0	100.00	
4	3	3	2	Simple (vertical queueing)	Normal	0	100.00	

Demand overview (Traffic)

Junction	Arm	Linked arm	Profile type	Use O-D data	Av. Demand (PCU/hr)	Scaling Factor (%)
3	1		ONE HOUR	✓	967	100.000
	2	✓				
	3		ONE HOUR	✓	950	100.000
	4		ONE HOUR	✓	305	100.000
	5					
4	1		ONE HOUR	✓	442	100.000
	2		ONE HOUR	✓	298	100.000
	3	✓				

Origin-Destination Data

Junction 3

Demand (PCU/hr)

		To				
		1	2	3	4	5
From	1	0	92	765	80	30
	2	26	2	322	118	45
	3	259	331	0	15	345
	4	40	196	8	12	49
	5	0	0	0	0	0

Junction 4

Demand (PCU/hr)

		To		
		1	2	3
From	1	0	107	335
	2	113	1	184
	3	390	236	1

Vehicle Mix

Junction 3

HV %s

		To				
		1	2	3	4	5
From	1	0	8	4	18	0
	2	0	0	1	3	0
	3	8	2	0	0	2
	4	0	2	13	33	22
	5	0	0	0	0	0

Junction 4

HV %s

		To		
		1	2	3
From	1	0	4	2
	2	7	0	6
	3	0	0	0

Results

Results Summary for whole modelled period

Junction	Arm	Max RFC	Max Delay (s)	Max Q (PCU)	Max LOS	Av. Demand (PCU/hr)	Total Junction Arrivals (PCU)
3	1	0.46	3.09	0.9	A	887	1331
	2	0.75	19.01	2.9	C	477	715
	3	0.62	5.75	1.7	A	872	1308
	4	0.29	4.64	0.4	A	280	420
	5						
4	1	0.65	14.01	1.9	B	406	608
	2	0.37	6.87	0.6	A	273	410
	3	0.96	68.27	12.3	F	570	854

Main Results for each time segment

16:45 - 17:00

Junction	Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
3	1	728	182	412	2404	0.303	726	244	0.0	0.5	2.257	A
	2	389	97	672	866	0.449	385	466	0.0	0.8	7.544	A
	3	715	179	235	1747	0.409	712	822	0.0	0.7	3.593	A
	4	230	57	778	1316	0.174	229	169	0.0	0.2	3.496	A
	5			655				352				
4	1	333	83	174	807	0.412	330	370	0.0	0.7	7.689	A
	2	224	56	251	978	0.229	223	253	0.0	0.3	5.061	A
	3	466	116	85	739	0.631	459	389	0.0	1.6	12.610	B

17:00 - 17:15

Junction	Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
3	1	869	217	493	2356	0.369	869	292	0.5	0.6	2.546	A
	2	466	117	804	822	0.567	464	558	0.8	1.3	10.135	B
	3	854	214	282	1725	0.495	853	986	0.7	1.0	4.269	A
	4	274	69	932	1249	0.220	274	203	0.2	0.3	3.903	A
	5			785				421				
4	1	397	99	210	782	0.508	396	445	0.7	1.0	9.528	A
	2	268	67	301	939	0.285	267	305	0.3	0.4	5.698	A
	3	558	139	102	728	0.766	552	466	1.6	3.0	19.857	C

17:15 - 17:30

Junction	Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
3	1	1065	266	603	2292	0.465	1064	357	0.6	0.9	3.083	A
	2	570	142	984	763	0.747	564	682	1.3	2.8	17.818	C
	3	1046	261	344	1696	0.617	1043	1204	1.0	1.6	5.688	A
	4	336	84	1140	1158	0.290	335	247	0.3	0.4	4.624	A
	5			960				515				
4	1	487	122	249	754	0.646	484	532	1.0	1.8	13.500	B
	2	328	82	368	887	0.370	327	365	0.4	0.6	6.834	A
	3	682	171	125	714	0.956	656	570	3.0	9.7	47.914	E

17:30 - 17:45

Junction	Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
3	1	1065	266	604	2291	0.465	1065	358	0.9	0.9	3.090	A
	2	572	143	985	762	0.751	572	684	2.8	2.9	19.012	C
	3	1046	261	347	1694	0.617	1046	1210	1.6	1.7	5.749	A
	4	336	84	1144	1156	0.290	336	249	0.4	0.4	4.639	A
	5			963				517				
4	1	487	122	256	749	0.650	486	543	1.8	1.9	14.015	B
	2	328	82	370	885	0.371	328	372	0.6	0.6	6.873	A
	3	684	171	126	713	0.958	673	572	9.7	12.3	68.266	F

17:45 - 18:00

Junction	Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
3	1	869	217	495	2355	0.369	870	294	0.9	0.6	2.554	A
	2	470	118	806	822	0.572	476	560	2.9	1.4	10.743	B
	3	854	214	287	1723	0.496	857	995	1.7	1.0	4.315	A
	4	274	69	938	1247	0.220	275	206	0.4	0.3	3.920	A
	5			789				424				
4	1	397	99	225	771	0.516	400	471	1.9	1.1	10.042	B
	2	268	67	304	936	0.286	269	321	0.6	0.4	5.740	A
	3	560	140	103	728	0.769	594	470	12.3	3.7	31.785	D

18:00 - 18:15

Junction	Arm	Total Demand (PCU/hr)	Junction Arrivals (PCU)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	Throughput (exit) (PCU/hr)	Start queue (PCU)	End queue (PCU)	Delay (s)	Unsignalised level of service
3	1	728	182	414	2403	0.303	729	245	0.6	0.5	2.264	A
	2	393	98	674	865	0.454	395	468	1.4	0.9	7.796	A
	3	715	179	239	1745	0.410	716	830	1.0	0.7	3.625	A
	4	230	57	784	1314	0.175	230	172	0.3	0.2	3.511	A
	5			659				354				
4	1	333	83	181	803	0.415	334	381	1.1	0.7	7.903	A
	2	224	56	254	976	0.230	225	261	0.4	0.3	5.101	A
	3	468	117	86	738	0.634	476	393	3.7	1.8	14.084	B