

APPENDIX C

TRICS DATA

*For inspection purposes only.
Consent of copyright owner required for any other use.*



TRIP RATE CALCULATION SELECTION PARAMETERS:

Land Use : 02 - EMPLOYMENT
Category : D - INDUSTRIAL ESTATE

VEHICLES

Selected regions and areas:

03	SOUTH WEST	
	CW CORNWALL	1 days
	WL WILTSHIRE	1 days
04	EAST ANGLIA	
	CA CAMBRIDGESHIRE	1 days
	NF NORFOLK	1 days
	SF SUFFOLK	2 days
05	EAST MIDLANDS	
	DS DERBYSHIRE	1 days
	LN LINCOLNSHIRE	1 days
	NT NOTTINGHAMSHIRE	1 days
06	WEST MIDLANDS	
	ST STAFFORDSHIRE	1 days
	WM WEST MIDLANDS	1 days
07	YORKSHIRE & NORTH LINCOLNSHIRE	
	KH KINGSTON UPON HULL	1 days
	NY NORTH YORKSHIRE	1 days
	WY WEST YORKSHIRE	2 days
08	NORTH WEST	
	CH CHESHIRE	1 days
	LC LANCASHIRE	1 days
	MS MERSEYSIDE	1 days
09	NORTH	
	CB CUMBRIA	1 days
	DH DURHAM	1 days
	NB NORTHUMBERLAND	1 days
	TW TYNE & WEAR	1 days
11	SCOTLAND	
	DG DUMFRIES & GALLOWAY	1 days
	EA EAST AYRSHIRE	1 days
	ER EAST RENFREWSHIRE	2 days
15	GREATER DUBLIN	
	DL DUBLIN	3 days

For inspection purposes only.
Consent of copyright owner required for any other use.



Main parameter selection:

Parameter: Gross floor area
Range: 552 to 234115 (units: sqm)

Date Range: 01/01/99 to 07/09/08

Selected survey days:

Monday	3 days
Tuesday	9 days
Wednesday	6 days
Thursday	4 days
Friday	7 days

Selected survey types:

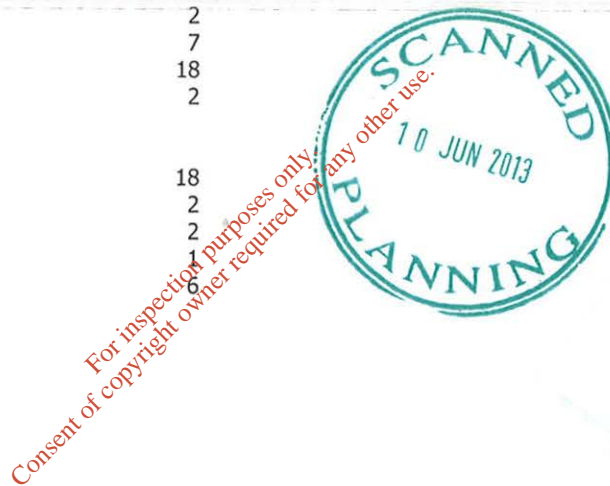
Manual count	28 days
Directional ATC Count	1 days

Selected Locations:

Edge of Town Centre	2
Suburban Area (PPS6 Out of Centre)	7
Edge of Town	18
Free Standing (PPS6 Out of Town)	2

Selected Location Sub Categories:

Industrial Zone	18
Residential Zone	2
Built-Up Zone	2
Out of Town	1
No Sub Category	6



LIST OF SITES relevant to selection parameters

1	CA-02-D-01	IND. ESTATE, PETERBOROUGH	CAMBRIDGESHIRE
	STURROCK WAY BRETTON PETERBOROUGH Total Gross floor area: 4300 sqm		
2	CB-02-D-03	INDUSTRIAL ESTATE, BRAMPTON	CUMBRIA
	CARLISLE ROAD BRAMPTON Total Gross floor area: 13700 sqm		
3	CH-02-D-02	INDUSTRIAL EST., NORTHWICH	CHESHIRE
	MANCHESTER ROAD WINCHAM NORTHWICH Total Gross floor area: 22000 sqm		
4	CW-02-D-02	INDUSTRIAL ESTATE, CAMBORNE	CORNWALL
	DRUIDS ROAD CAMBORNE Total Gross floor area: 6515 sqm		
5	DG-02-D-01	BUSINESS PARK, NEAR DUMFRIES	DUMFRIES & GALLOWAY
	A75(T) CARGENBRIDGE NEAR DUMFRIES Total Gross floor area: 5980 sqm		
6	DH-02-D-01	INDUSTRIAL ESTATE, NR CONSETT	DURHAM
	PARKWAY ANNFIELD PLAIN NEAR CONSETT Total Gross floor area: 12025 sqm		
7	DL-02-D-01	INDUSTRIAL ESTATE, DUBLIN	DUBLIN
	SWORDS ROAD SANTRY DUBLIN Total Gross floor area: 83000 sqm		
8	DL-02-D-02	INDUSTRIAL ESTATE, DUBLIN	DUBLIN
	GRANGE ROAD BALDOYLE DUBLIN Total Gross floor area: 100000 sqm		
9	DL-02-D-03	INDUSTRIAL ESTATE, DUBLIN	DUBLIN
	CLOVERHILL ROAD DUBLIN Total Gross floor area: 120000 sqm		
10	DS-02-D-01	IND. ESTATE, SOUTH NORMANTON	DERBYSHIRE
	BERRISTOW LANE SOUTH NORMANTON Total Gross floor area: 92286 sqm		
11	EA-02-D-02	INDUSTRIAL EST., KILMARNOCK	EAST AYRSHIRE
	JAMES LITTLE STREET KILMARNOCK Total Gross floor area: 552 sqm		
12	ER-02-D-01	INDUSTRIAL ESTATE, BARRHEAD	EAST RENFREWSHIRE
	MURIEL STREET BARRHEAD Total Gross floor area: 7211 sqm		



Consent of copyright owner required for any other use.
For inspection purposes only.

LIST OF SITES relevant to selection parameters (Cont.)

13	ER-02-D-02	INDUSTRIAL EST., NEAR GLASGOW	EAST RENFREWSHIRE
		SPIERSBRIDGE AVENUE THORNLIBANK NEAR GLASGOW Total Gross floor area: 4233 sqm	
14	KH-02-D-02	INDUSTRIAL ESTATE, HULL	KINGSTON UPON HULL
		BOULEVARD STREET KINGSTON UPON HULL Total Gross floor area: 2220 sqm	
15	LC-02-D-04	INDUSTRIAL ESTATE, GARSTANG	LANCASHIRE
		GREEN LANE WEST GARSTANG Total Gross floor area: 4555 sqm	
16	LN-02-D-01	INDUSTRIAL ESTATE, GRANTHAM	LINCOLNSHIRE
		BELTON LANE GRANTHAM Total Gross floor area: 5347 sqm	
17	MS-02-D-05	INDUSTRIAL ESTATE, ST HELENS	MERSEYSIDE
		BROADOAK ROAD ST HELENS Total Gross floor area: 11700 sqm	
18	NB-02-D-01	INDUSTRIAL ESTATE, HEXHAM	NORTHUMBERLAND
		A695 HEXHAM Total Gross floor area: 10525 sqm	
19	NF-02-D-02	INDUSTRIAL ESTATE, DEREHAM	NORFOLK
		RASHES GREEN BRECKLAND DEREHAM Total Gross floor area: 51000 sqm	
20	NT-02-D-01	IND. ESTATE, SUTTON-IN-ASHFIELD	NOTTINGHAMSHIRE
		B6028 STONEYFORD ROAD STANTON HILL SUTTON-IN-ASHFIELD Total Gross floor area: 26400 sqm	
21	NY-02-D-01	INDUSTRIAL ESTATE, SHERBURN	NORTH YORKSHIRE
		AVIATION WAY SHERBURN IN ELMET Total Gross floor area: 1197 sqm	
22	SF-02-D-01	INDUSTRIAL ESTATE, IPSWICH	SUFFOLK
		RAPIER STREET STOKE IPSWICH Total Gross floor area: 17500 sqm	
23	SF-02-D-02	INDUSTRIAL ESTATE, IPSWICH	SUFFOLK
		HADLEIGH ROAD WESTBOURNE IPSWICH Total Gross floor area: 102000 sqm	
24	ST-02-D-04	INDUSTRIAL ESTATE, LICHFIELD	STAFFORDSHIRE
		BURTON OLD ROAD BOLEY PARK LICHFIELD Total Gross floor area: 40905 sqm	



Consent of copyholder for reproduction purposes only. No consent of copyholder required for any other use.

LIST OF SITES relevant to selection parameters (Cont.)

25	TW-02-D-06 NORHAM ROAD WEST CHIRTON NORTH SHIELDS Total Gross floor area: 23000 sqm	INDUSTRIAL ESTATE, N. SHIELDS	TYNE & WEAR
26	WL-02-D-01 MARLBOROUGH ROAD WOOTTON BASSETT Total Gross floor area: 7050 sqm	IND. ESTATE, WOOTTON BASSETT	WILTSHIRE
27	WM-02-D-01 MELCHETT ROAD KINGS NORTON BIRMINGHAM Total Gross floor area: 2510 sqm	INDUSTRIAL EST., BIRMINGHAM	WEST MIDLANDS
28	WY-02-D-01 PARK HOUSE WEST	INDUSTRIAL ESTATE, LEEDS	WEST YORKSHIRE
29	LEEDS Total Gross floor area: 4225 sqm WY-02-D-02 A629 WAKEFIELD ROAD TANDEM HUDDERSFIELD Total Gross floor area: 20824 sqm	INDUSTRIAL EST., HUDDERSFIELD	WEST YORKSHIRE

For inspection purposes only.
Consent of copyright owner required for any other use.



TRIP RATE for Land Use 02 - EMPLOYMENT/D - INDUSTRIAL ESTATE

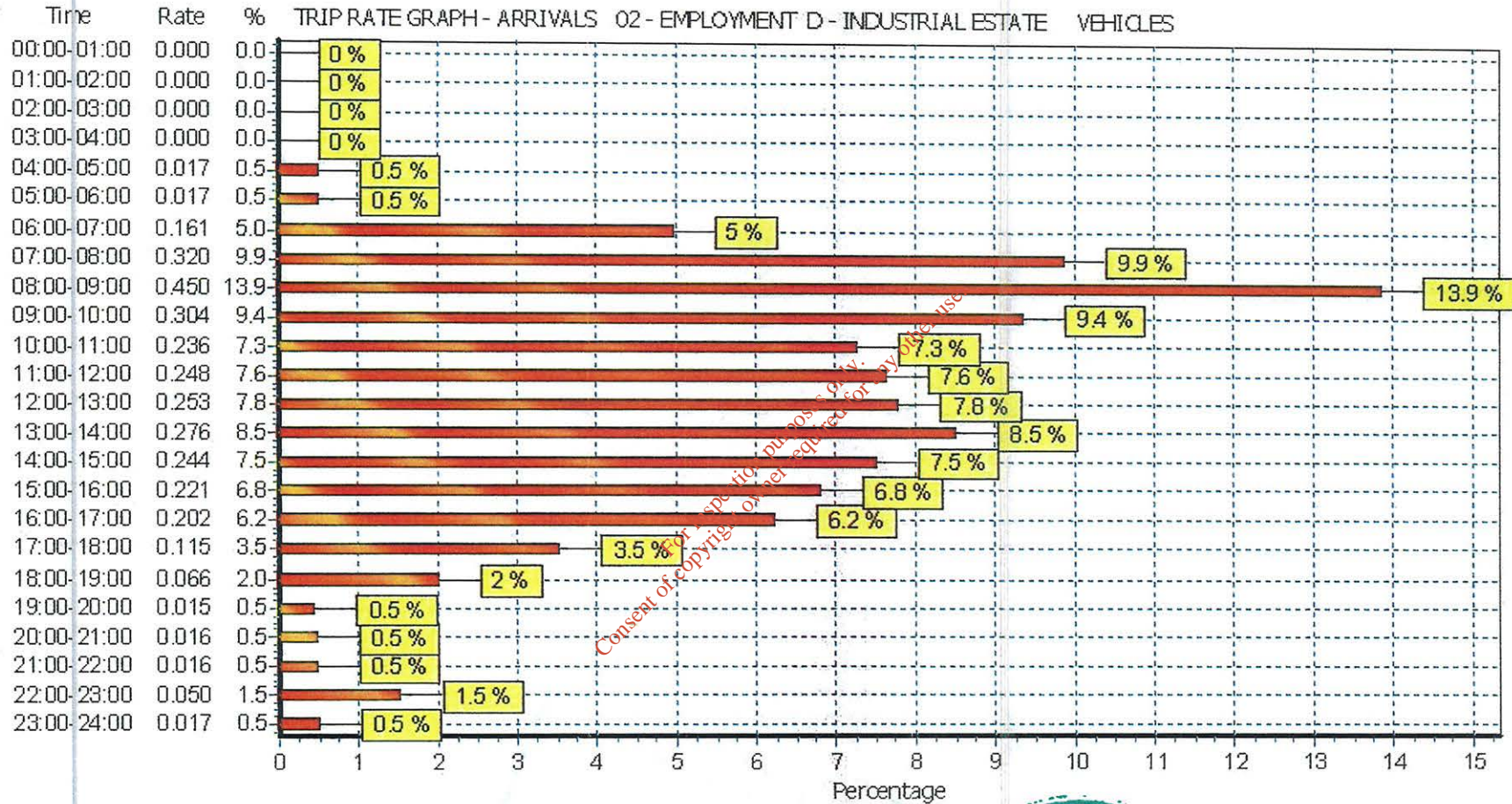
VEHICLES

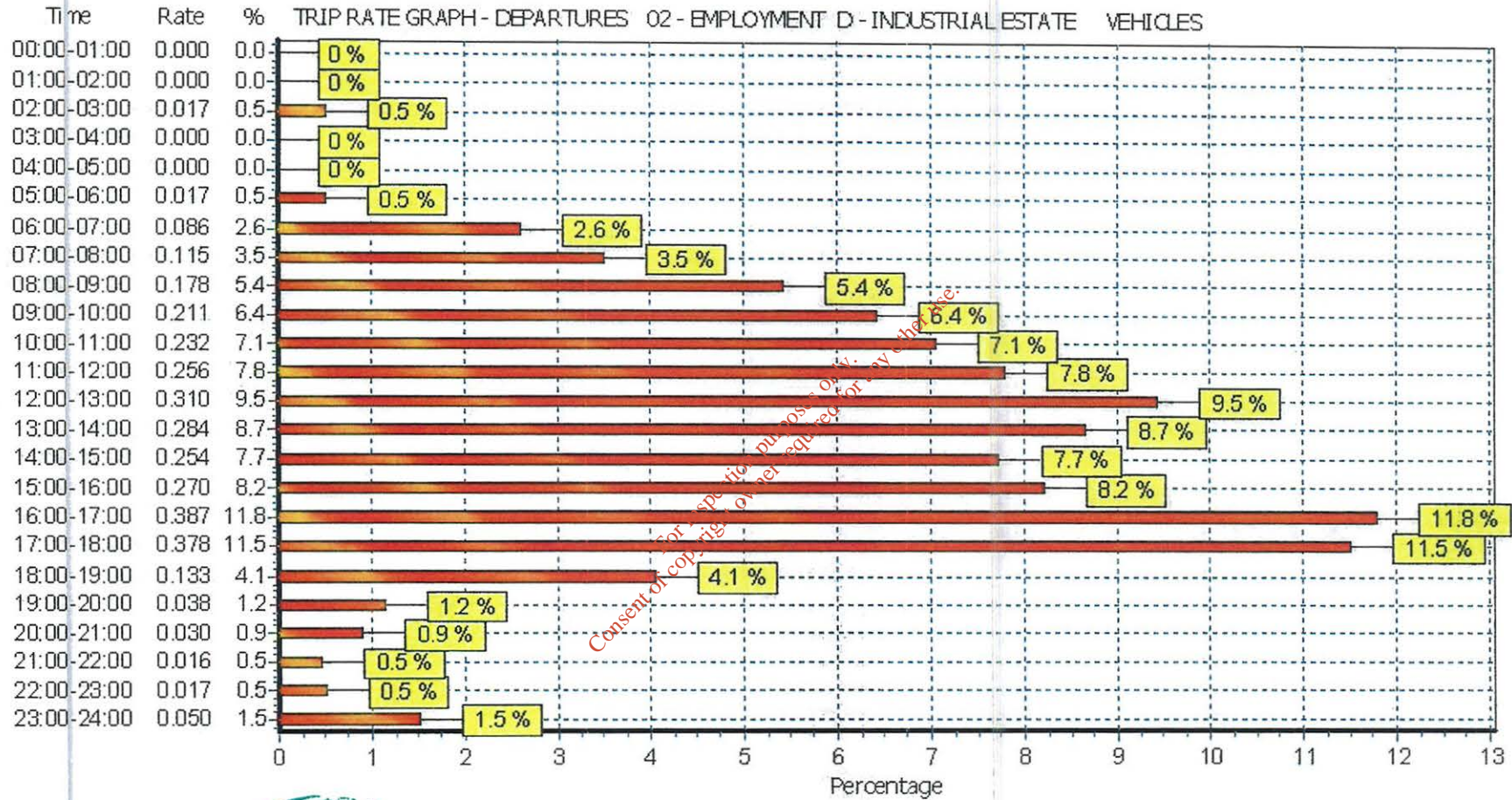
Calculation factor: 100 sqm

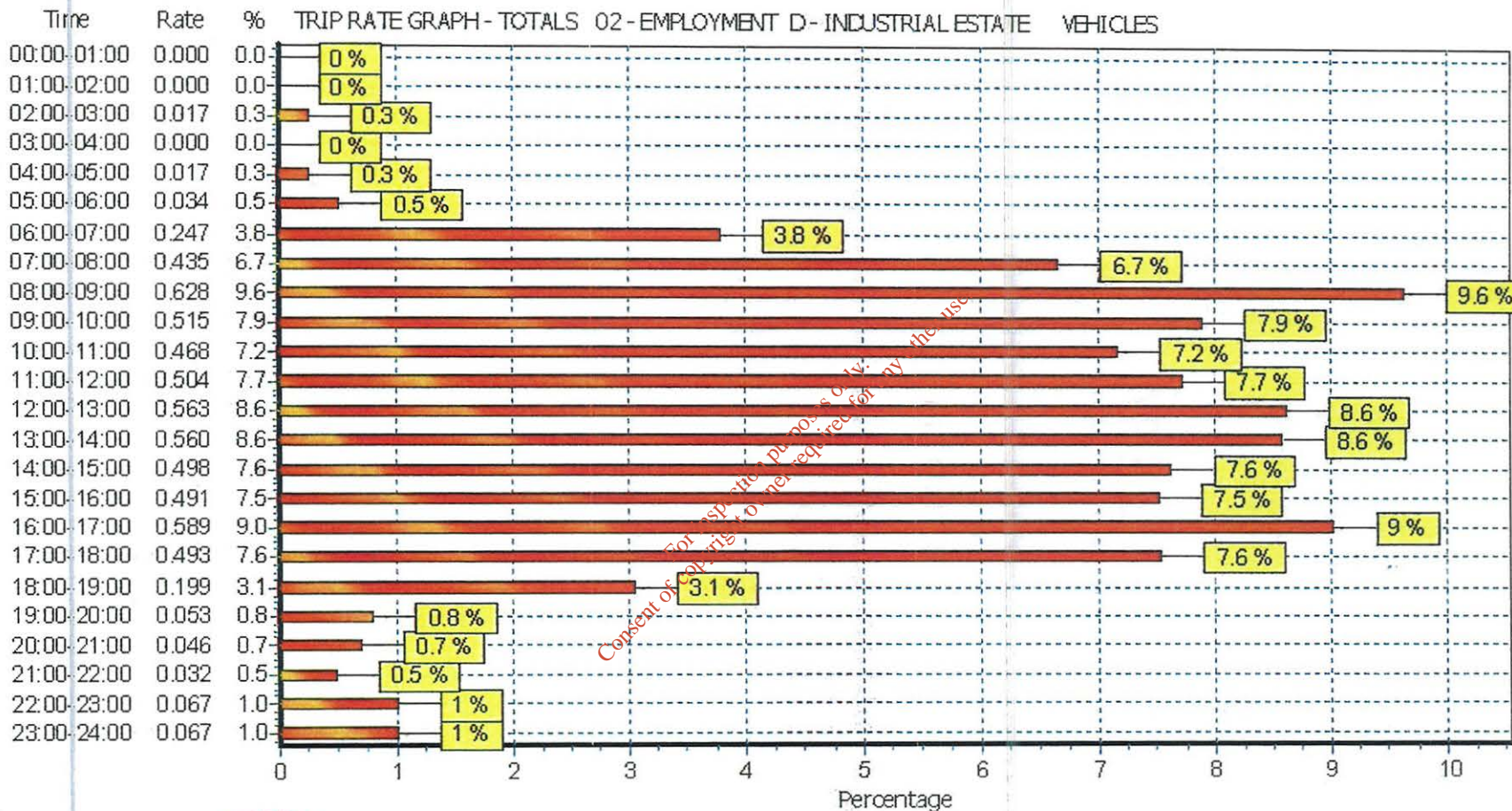
BOLD print indicates peak (busiest) period



Time Range	ARRIVALS			DEPARTURES			TOTALS		
	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 00:30	1	5980	0.000	1	5980	0.000	1	5980	0.000
00:30 - 01:00	1	5980	0.000	1	5980	0.000	1	5980	0.000
01:00 - 01:30	1	5980	0.000	1	5980	0.000	1	5980	0.000
01:30 - 02:00	1	5980	0.000	1	5980	0.000	1	5980	0.000
02:00 - 02:30	1	5980	0.000	1	5980	0.000	1	5980	0.000
02:30 - 03:00	1	5980	0.000	1	5980	0.017	1	5980	0.017
03:00 - 03:30	1	5980	0.000	1	5980	0.000	1	5980	0.000
03:30 - 04:00	1	5980	0.000	1	5980	0.000	1	5980	0.000
04:00 - 04:30	1	5980	0.017	1	5980	0.000	1	5980	0.017
04:30 - 05:00	1	5980	0.000	1	5980	0.000	1	5980	0.000
05:00 - 05:30	1	5980	0.000	1	5980	0.017	1	5980	0.017
05:30 - 06:00	1	5980	0.017	1	5980	0.000	1	5980	0.017
06:00 - 06:30	3	5808	0.075	3	5808	0.040	3	5808	0.115
06:30 - 07:00	3	5808	0.086	3	5808	0.046	3	5808	0.132
07:00 - 07:30	28	28580	0.116	28	28580	0.051	28	28580	0.167
07:30 - 08:00	28	28580	0.204	28	28580	0.064	28	28580	0.268
08:00 - 08:30	29	27681	0.220	29	27681	0.083	29	27681	0.303
08:30 - 09:00	29	27681	0.230	29	27681	0.095	29	27681	0.325
09:00 - 09:30	29	27681	0.177	29	27681	0.098	29	27681	0.275
09:30 - 10:00	29	27681	0.127	29	27681	0.113	29	27681	0.240
10:00 - 10:30	29	27681	0.115	29	27681	0.116	29	27681	0.231
10:30 - 11:00	29	27681	0.121	29	27681	0.116	29	27681	0.237
11:00 - 11:30	29	27681	0.120	29	27681	0.123	29	27681	0.243
11:30 - 12:00	29	27681	0.128	29	27681	0.133	29	27681	0.261
12:00 - 12:30	29	27681	0.127	29	27681	0.155	29	27681	0.282
12:30 - 13:00	29	27681	0.126	29	27681	0.155	29	27681	0.281
13:00 - 13:30	29	27681	0.132	29	27681	0.155	29	27681	0.287
13:30 - 14:00	29	27681	0.144	29	27681	0.129	29	27681	0.273
14:00 - 14:30	29	27681	0.128	29	27681	0.127	29	27681	0.255
14:30 - 15:00	29	27681	0.116	29	27681	0.127	29	27681	0.243
15:00 - 15:30	29	27681	0.112	29	27681	0.129	29	27681	0.241
15:30 - 16:00	29	27681	0.109	29	27681	0.141	29	27681	0.250
16:00 - 16:30	29	27681	0.108	29	27681	0.175	29	27681	0.283
16:30 - 17:00	29	27681	0.094	29	27681	0.212	29	27681	0.306
17:00 - 17:30	29	27681	0.068	29	27681	0.224	29	27681	0.292
17:30 - 18:00	29	27681	0.047	29	27681	0.154	29	27681	0.201
18:00 - 18:30	28	28580	0.039	28	28580	0.083	28	28580	0.122
18:30 - 19:00	28	28580	0.027	28	28580	0.050	28	28580	0.077
19:00 - 19:30	2	6596	0.000	2	6596	0.015	2	6596	0.015
19:30 - 20:00	2	6596	0.015	2	6596	0.023	2	6596	0.038
20:00 - 20:30	2	6596	0.008	2	6596	0.015	2	6596	0.023
20:30 - 21:00	2	6596	0.008	2	6596	0.015	2	6596	0.023
21:00 - 21:30	2	6596	0.008	2	6596	0.008	2	6596	0.016
21:30 - 22:00	2	6596	0.008	2	6596	0.008	2	6596	0.016
22:00 - 22:30	1	5980	0.017	1	5980	0.017	1	5980	0.034
22:30 - 23:00	1	5980	0.033	1	5980	0.000	1	5980	0.033
23:00 - 23:30	1	5980	0.017	1	5980	0.017	1	5980	0.034
23:30 - 24:00	1	5980	0.000	1	5980	0.033	1	5980	0.033
Total Rates:			3.244			3.279			6.523







PICADY

GUI Version: 5.00 AC
 Analysis Program Release: 3.0 INTERIM (MAR 2006)

© Copyright TRL Limited, 2006
 Adapted from PICADY/3 which is Crown Copyright by permission of the controller of HMSO
 For sales and distribution information, program advice and maintenance, contact:

TRL Limited
 Crowthorne House
 Nine Mile Ride
 Wokingham, Berks.
 RG40 3GA, UK



Tel: +44 (0)1344 770758
 Fax: +44 (0)1344 770864
 E-mail: softwarebureau@trl.co.uk
 Web: www.trlsoftware.co.uk

The user of this computer program for the solution of an engineering problem is in no way relieved of their responsibility for the correctness of the solution

Run Analysis

Parameter	Values
File Run	W:\Projects\7097 - TIA Limerick WMF\05-Design\01-Calculations\PICADY\7097-AM.vpi
Date Run	12 February 2013
Time Run	11:59:00
Driving Side	Drive On The Left

Arm Names and Flow Scaling Factors

Arm	Arm Name	Flow Scaling Factor (%)
Arm A	N69 to Askeaton	100
Arm B	Development	100
Arm C	N69 to Limerick	100

Stream Labelling Convention

Stream A-B contains traffic going from A to B etc.

Run Information

Parameter	Values
Run Title	7097-Dock Road
Location	Limerick
Date	08 February 2013
Enumerator	Brendan Ward [DUB-35LJ52J-BW]
Job Number	7097
Status	TIA
Client	Greenstar
Description	-



For inspection purposes only.
 Content of copyright owner required for any other use.

Errors and Warnings

Parameter	Values
Warning	No Errors Or Warnings

Geometric Data

Geometric Parameters

Parameter	Minor Arm B
Major Road Carriageway Width (m)	11.20
Major Road Kerbed Central Reserve Width (m)	0.00
Major Road Right Turning Lane Width (m)	3.80
Minor Road Width 0m Back from Junction (m)	10.00
Minor Road Width 5m Back from Junction (m)	8.00
Minor Road Width 10m Back from Junction (m)	6.00
Minor Road Width 15m Back from Junction (m)	3.00
Minor Road Width 20m Back from Junction (m)	3.00
Minor Road Derived Flare Length (PCU)	2.000
Minor Road Visibility To Right (m)	0
Minor Road Visibility To Left (m)	0
Major Road Right Turn Visibility (m)	100
Major Road Right Turn Blocks Traffic	No

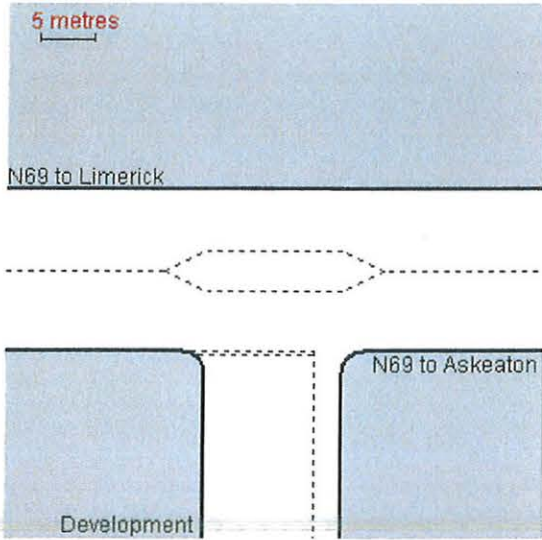
Slope and Intercept Values

Stream	Intercept for Stream B-A	Slope for A-B	Slope for A-C	Slope for C-A	Slope for C-B
B-A	439.579	0.062	0.157	0.099	0.224
B-C	573.963	0.068	0.172	-	-
C-B	741.905	0.222	0.222	-	-

Note: Streams may be combined in which case capacity will be adjusted
These values do not allow for any site-specific corrections



Junction Diagram



Demand Data

Modelling Periods

Parameter	Period	Duration (min)	Segment Length (min)
First Modelling Period	08:00-09:30	90	1

ODTAB Turning Counts

Demand Set: Existing AM
 Modelling Period: 08:00-09:30

From/To	Arm A	Arm B	Arm C
Arm A	0.0	13.0	1127.0
Arm B	9.0	0.0	12.0
Arm C	844.0	10.0	0.0

For inspection purposes only.
 Consent of copyright owner required for any other use.



Demand Set: AM 2013 + Dev
Modelling Period: 08:00-09:30

From/To	Arm A	Arm B	Arm C
Arm A	0.0	19.0	1172.0
Arm B	13.0	0.0	17.0
Arm C	863.0	14.0	0.0

Demand Set: AM 2028
Modelling Period: 08:00-09:30

From/To	Arm A	Arm B	Arm C
Arm A	0.0	13.0	1482.0
Arm B	9.0	0.0	12.0
Arm C	1109.0	10.0	0.0

Demand Set: AM 2028 + Dev
Modelling Period: 08:00-09:30

From/To	Arm A	Arm B	Arm C
Arm A	0.0	19.0	1527.0
Arm B	13.0	0.0	17.0
Arm C	1128.0	14.0	0.0



ODTAB Synthesised Flows

Demand Set: Existing AM
Modelling Period: 08:00-09:30

Arm	Rising Time	Rising Flow (veh/min)	Peak Time	Peak Flow (veh/min)	Falling Time	Falling Flow (veh/min)
Arm A	08:15	14.250	08:15	21.375	08:45	14.250
Arm B	08:15	0.262	08:15	0.394	08:45	0.262
Arm C	08:15	10.675	08:15	16.013	08:45	10.675

Heavy Vehicles Percentages

Demand Set: Existing AM
Modelling Period: 08:00-09:30

From/To	Arm A	Arm B	Arm C
Arm A	-	0.0	0.0
Arm B	0.0	-	0.0
Arm C	0.0	0.0	-

For inspection purposes only. Consent of copyright owner required for any other use.

Demand Set: AM 2013 + Dev
Modelling Period: 08:00-09:30

From/To	Arm A	Arm B	Arm C
Arm A	-	0.0	0.0
Arm B	0.0	-	0.0
Arm C	0.0	0.0	-

Demand Set: AM 2028
Modelling Period: 08:00-09:30

From/To	Arm A	Arm B	Arm C
Arm A	-	0.0	0.0
Arm B	0.0	-	0.0
Arm C	0.0	0.0	-

Demand Set: AM 2028 + Dev
Modelling Period: 08:00-09:30

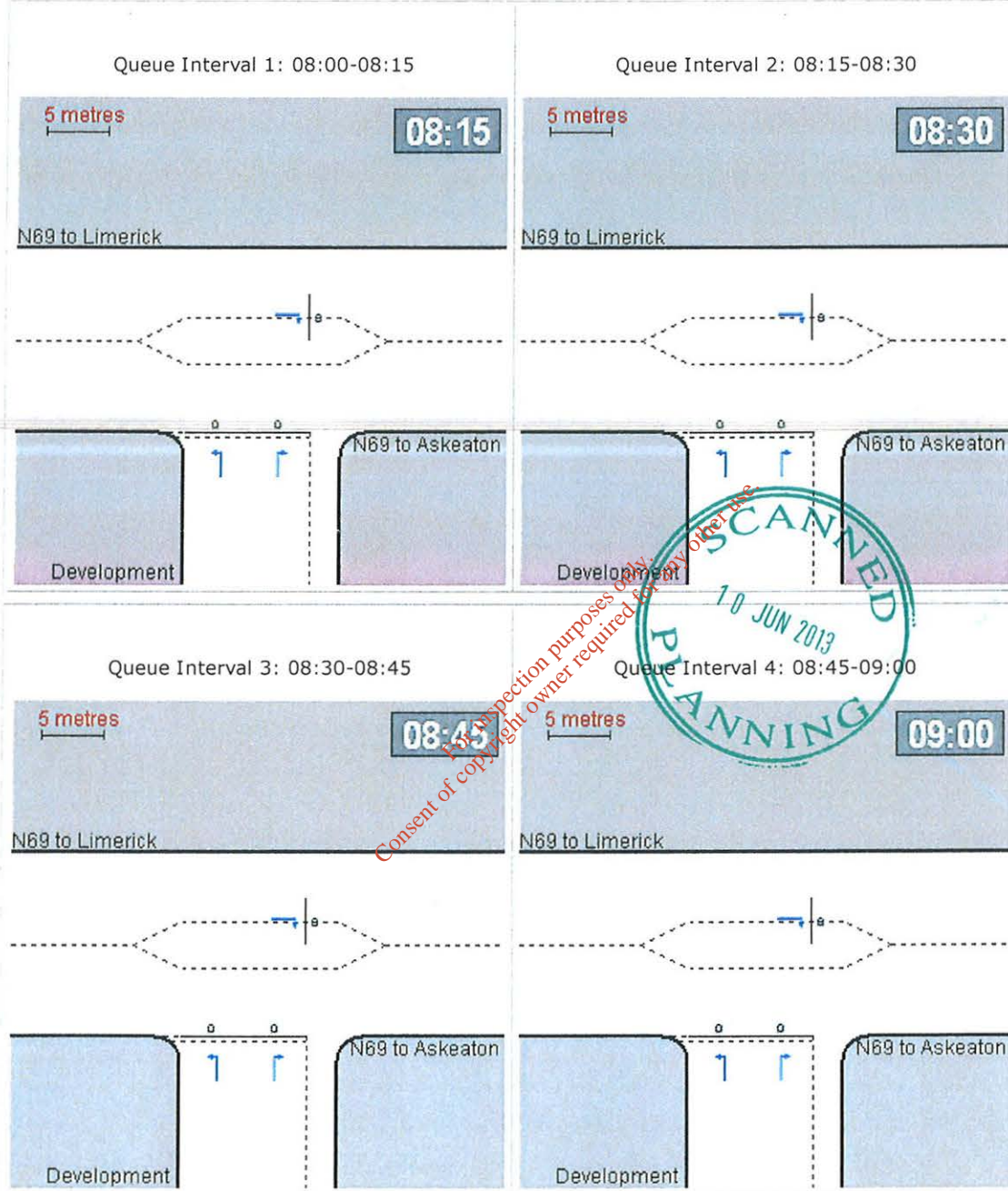
From/To	Arm A	Arm B	Arm C
Arm A	-	0.0	0.0
Arm B	0.0	-	0.0
Arm C	0.0	0.0	-

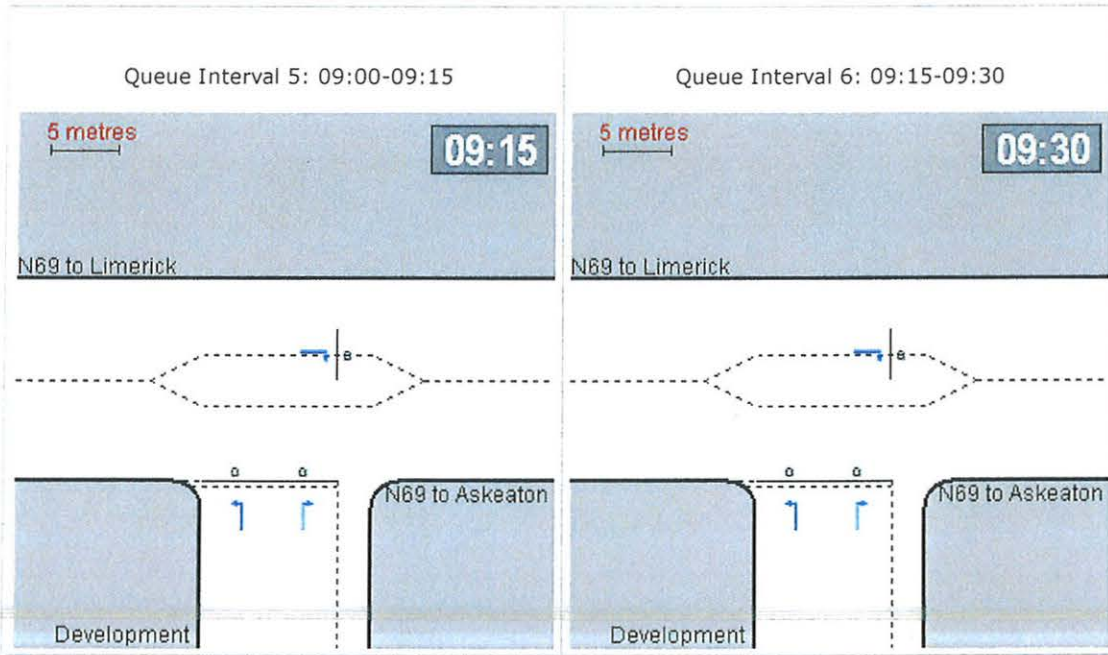


For inspection purposes only.
 Consent of copyright owner required for any other use.

Queue Diagrams

Demand Set: Existing AM
Modelling Period: 08:00-09:30
View Extent: 40m

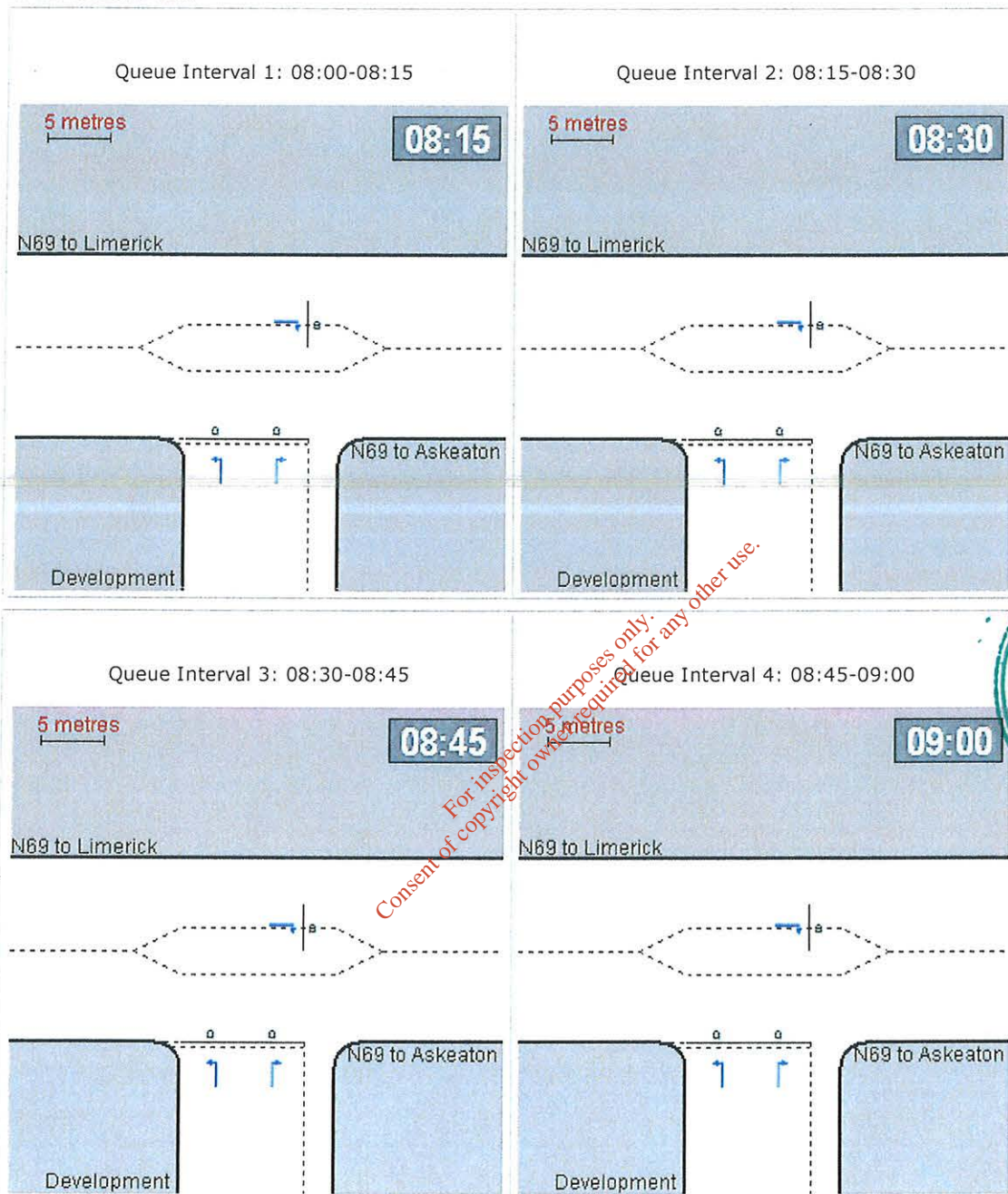




For inspection purposes only.
Consent of copyright owner required for any other use.

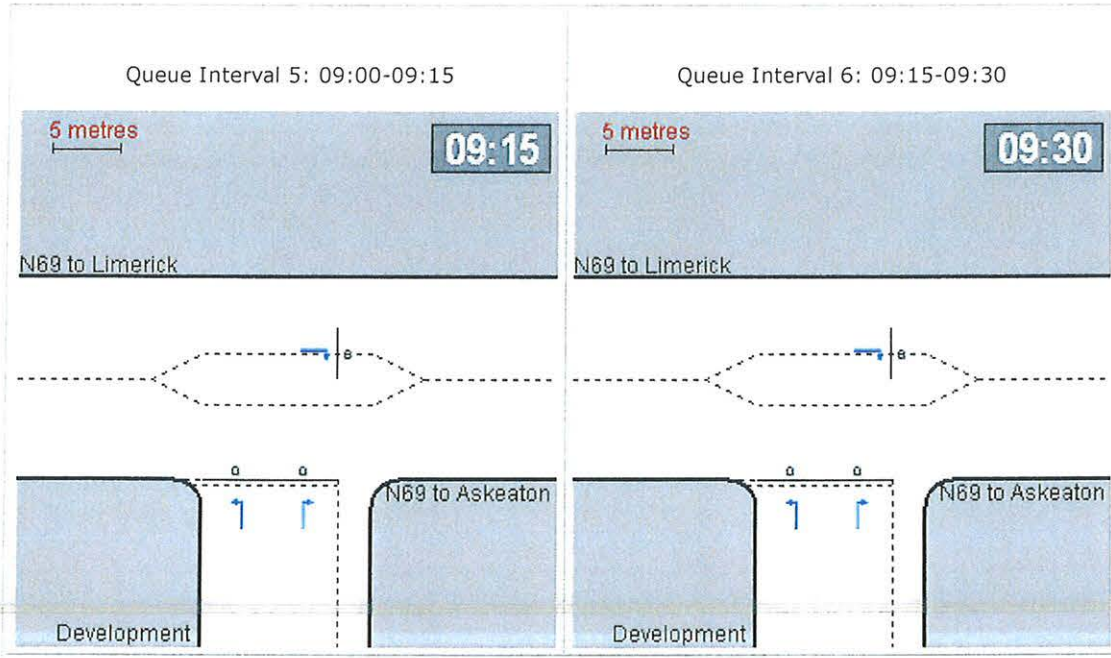


Demand Set: AM 2013 + Dev
Modelling Period: 08:00-09:30
View Extent: 40m



*For inspection purposes only.
Consent of copyright owner required for any other use.*

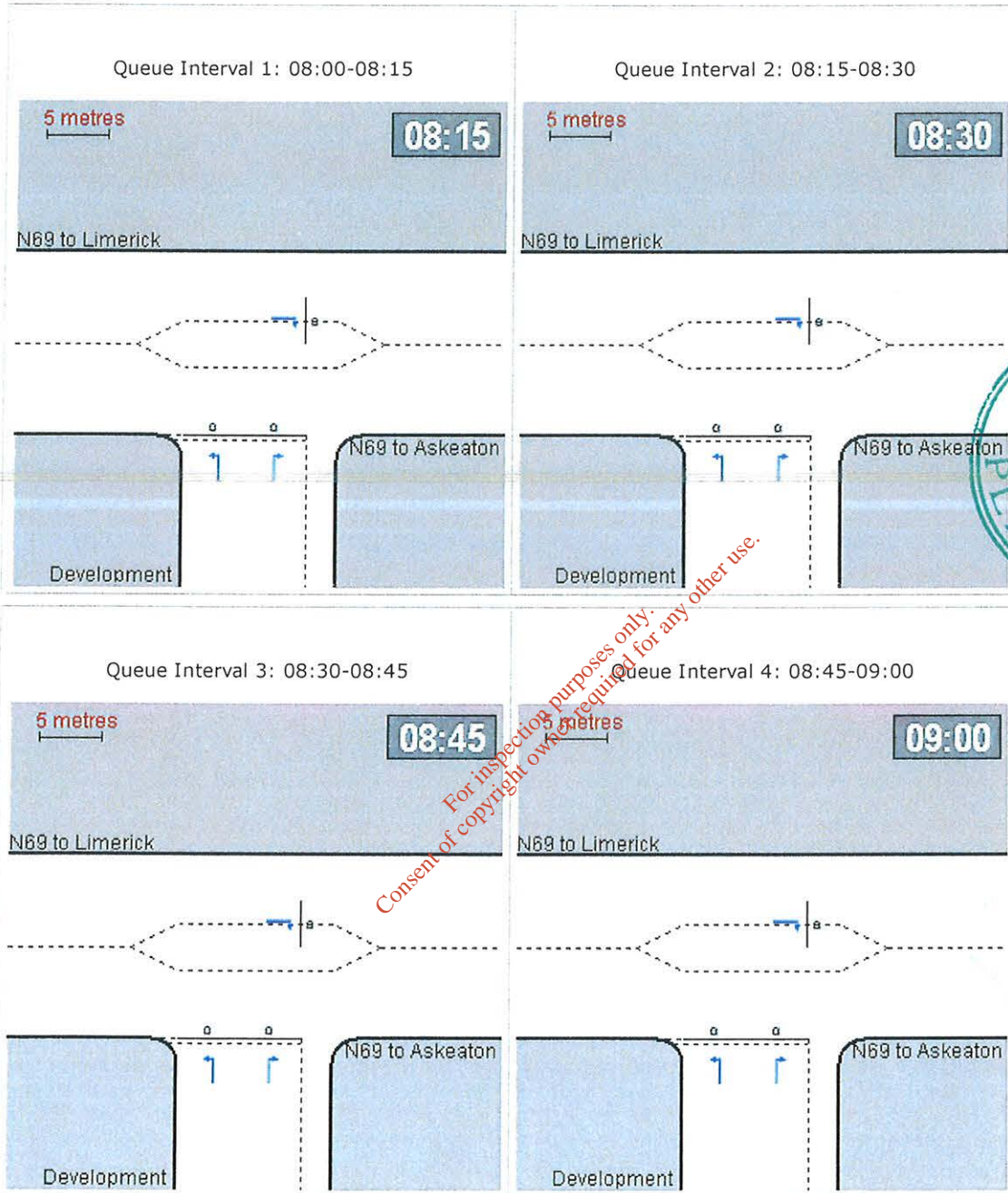




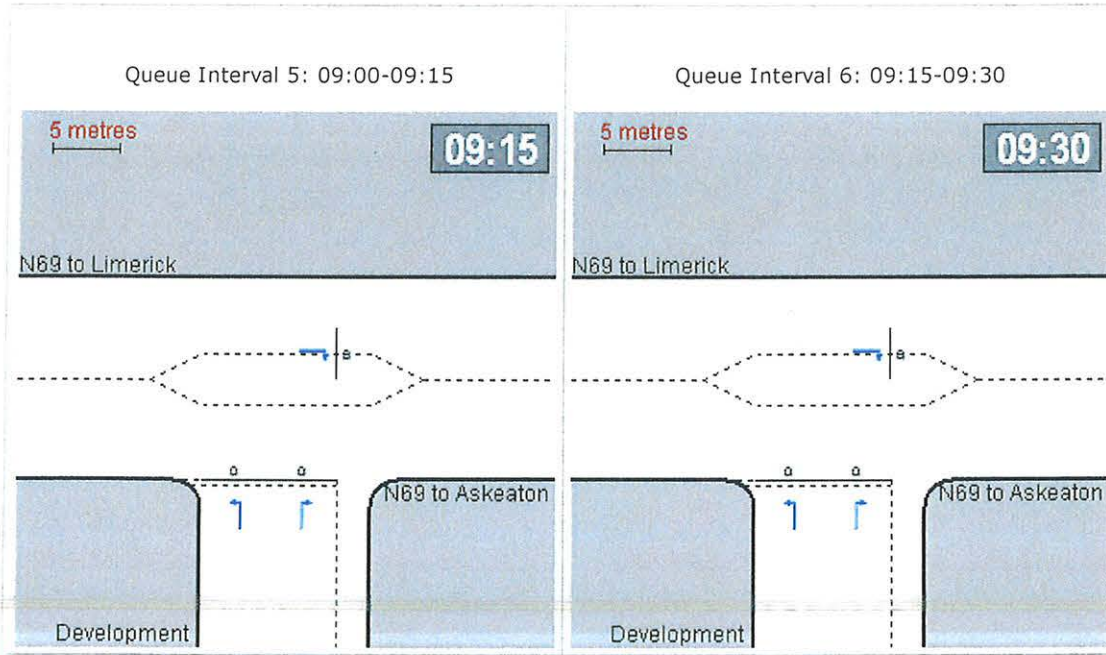
For inspection purposes only
Consent of copyright owner required for any other use.

RECORDED
10 JUN 2013
PLANNING

Demand Set: AM 2028
Modelling Period: 08:00-09:30
View Extent: 40m



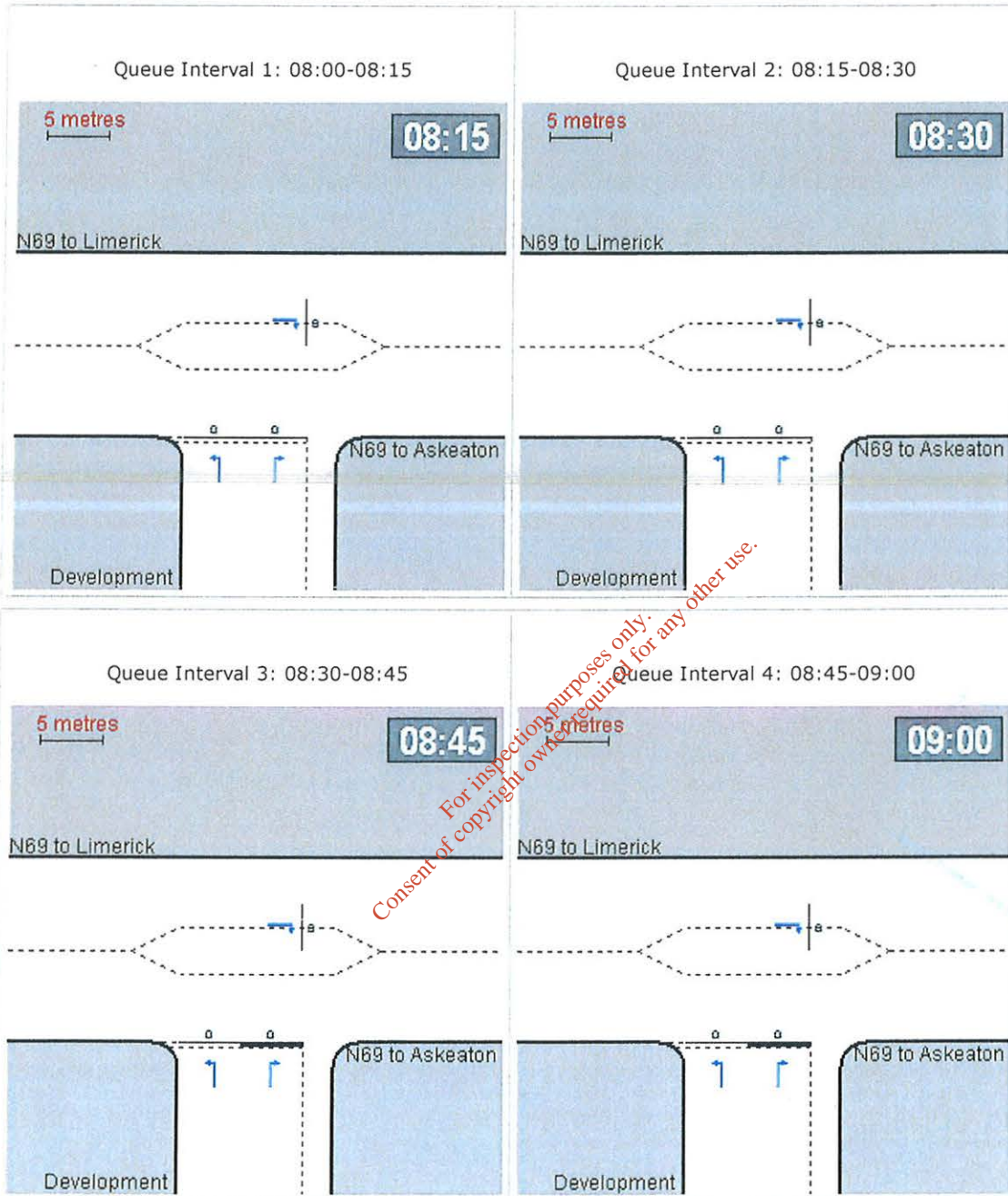
For inspection purposes only.
Consent of copyright owner required for any other use.

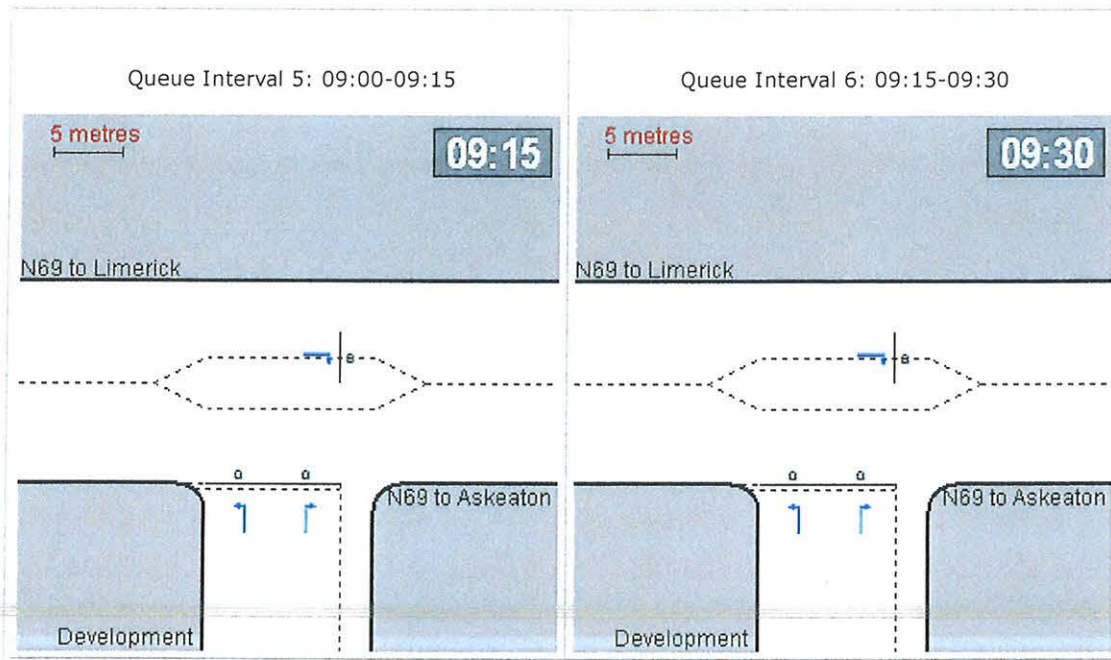


For inspection purposes only.
Consent of copyright owner required for any other use.



Demand Set: AM 2028 + Dev
Modelling Period: 08:00-09:30
View Extent: 40m



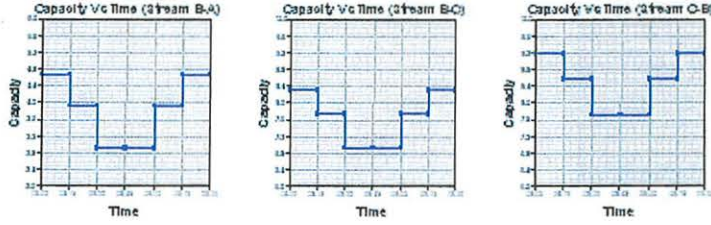


For inspection purposes only.
Consent of copyright owner required for any other use.

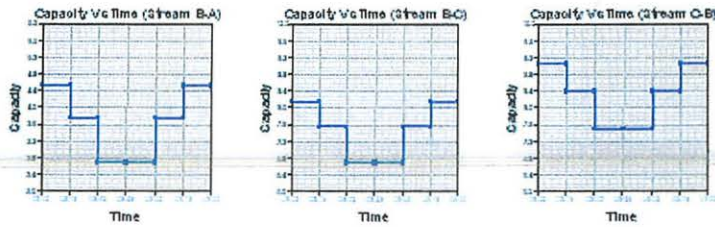


Capacity Graph

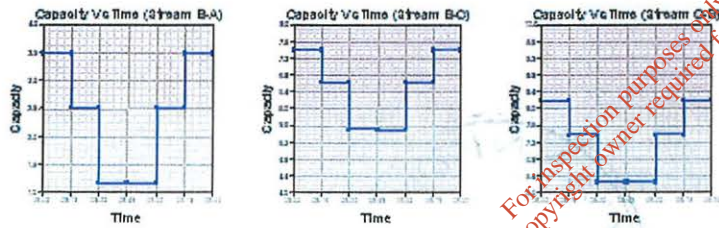
Demand Set: Existing AM
Modelling Period: 08:00-09:30



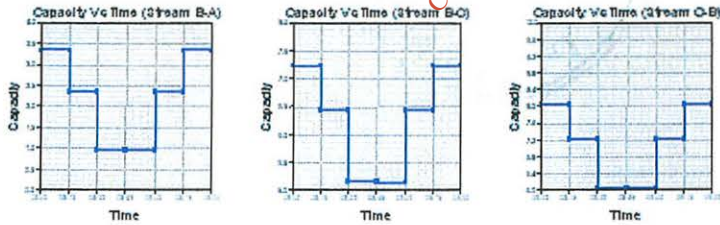
Demand Set: AM 2013 + Dev
Modelling Period: 08:00-09:30



Demand Set: AM 2028
Modelling Period: 08:00-09:30



Demand Set: AM 2028 + Dev
Modelling Period: 08:00-09:30

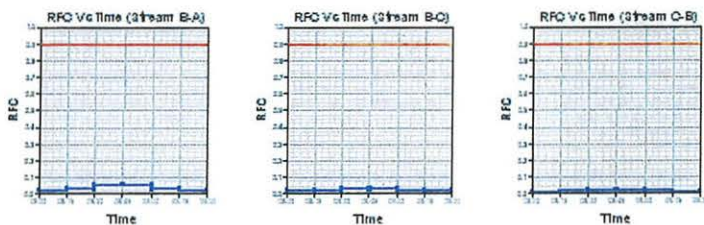


For inspection purposes only.
Consent of copyright owner required for any other use.

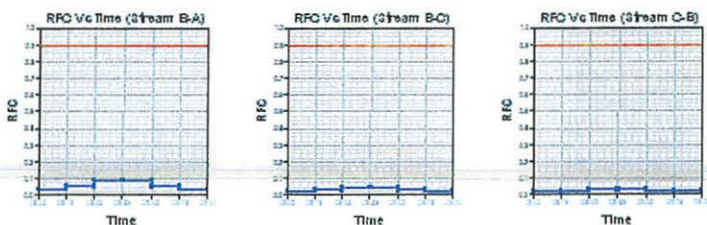


RFC Graph

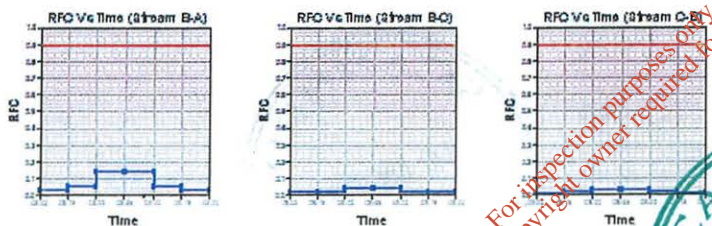
Demand Set: Existing AM
Modelling Period: 08:00-09:30



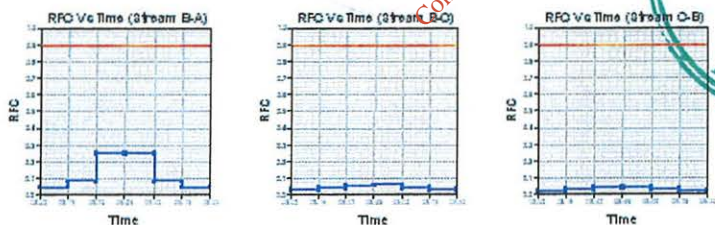
Demand Set: AM 2013 + Dev
Modelling Period: 08:00-09:30



Demand Set: AM 2028
Modelling Period: 08:00-09:30



Demand Set: AM 2028 + Dev
Modelling Period: 08:00-09:30

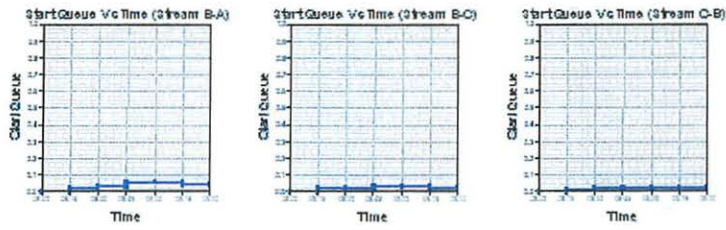


For inspection purposes only.
Consent of copyright owner required for any other use.

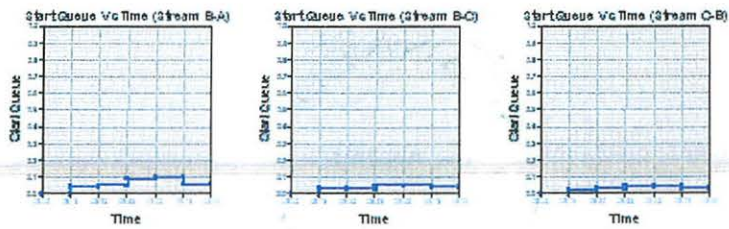


Start Queue Graph

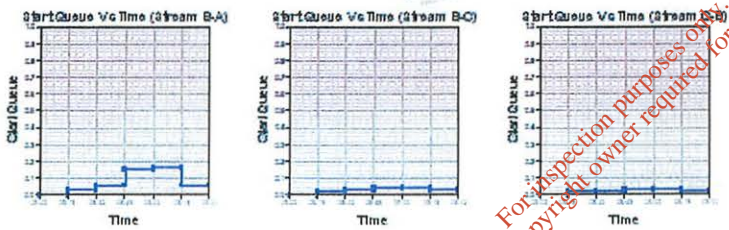
Demand Set: Existing AM
Modelling Period: 08:00-09:30



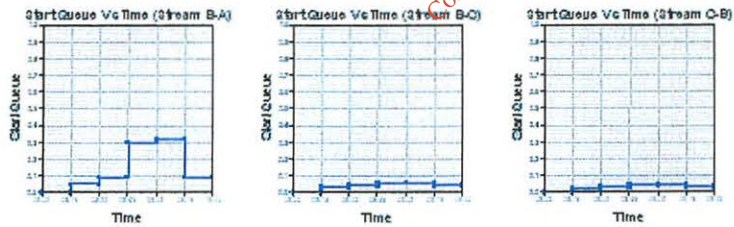
Demand Set: AM 2013 + Dev
Modelling Period: 08:00-09:30



Demand Set: AM 2028
Modelling Period: 08:00-09:30



Demand Set: AM 2028 + Dev
Modelling Period: 08:00-09:30

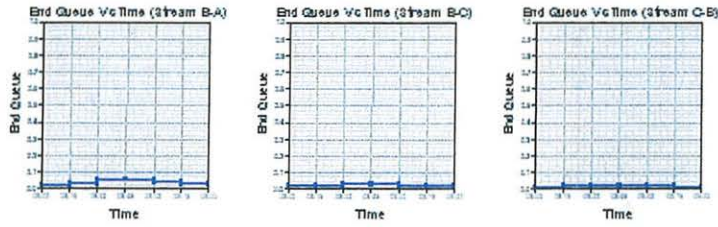


For inspection purposes only.
Consent of copyright owner required for any other use.

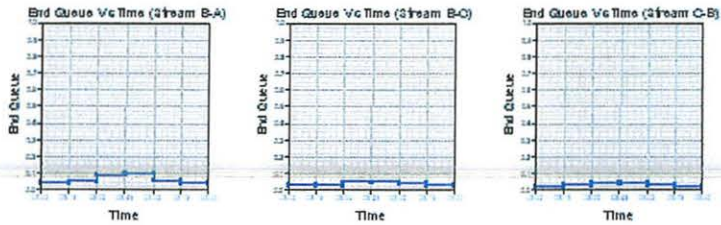


End Queue Graph

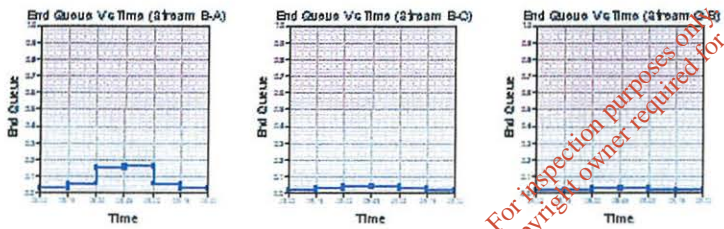
Demand Set: Existing AM
Modelling Period: 08:00-09:30



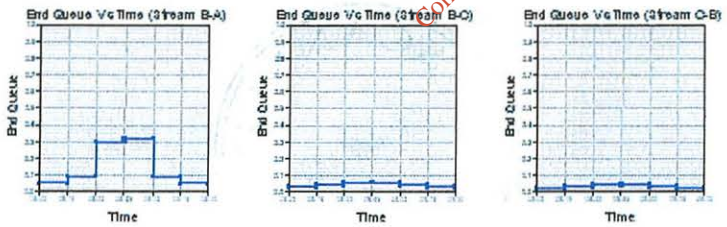
Demand Set: AM 2013 + Dev
Modelling Period: 08:00-09:30



Demand Set: AM 2028
Modelling Period: 08:00-09:30



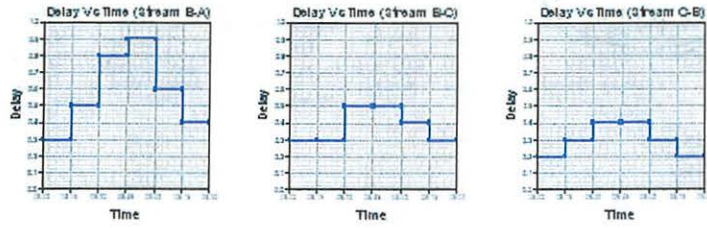
Demand Set: AM 2028 + Dev
Modelling Period: 08:00-09:30



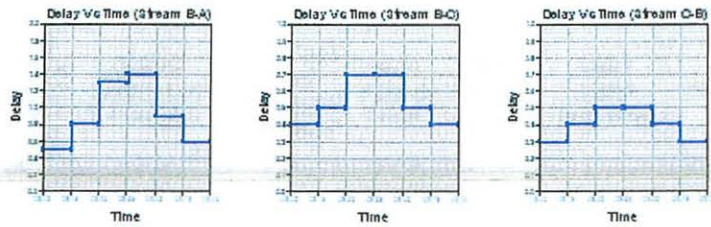
For inspection purposes only
Consent of copyright owner required for any other use.

Delay Graph

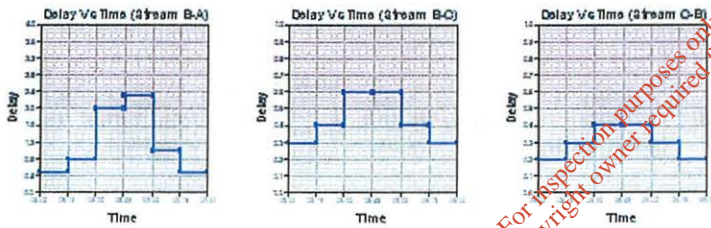
Demand Set: Existing AM
Modelling Period: 08:00-09:30



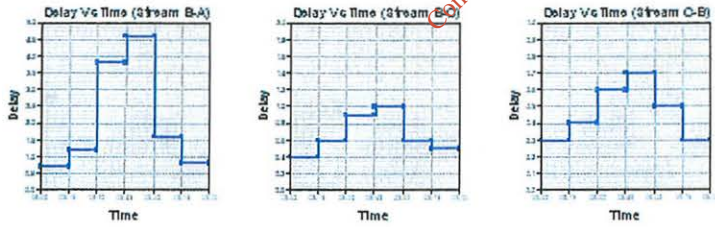
Demand Set: AM 2013 + Dev
Modelling Period: 08:00-09:30



Demand Set: AM 2028
Modelling Period: 08:00-09:30



Demand Set: AM 2028 + Dev
Modelling Period: 08:00-09:30



For inspection purposes only.
Consent of copyright owner required for any other use.





Queues & Delays

Demand Set: Existing AM
Modelling Period: 08:00-09:30

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/segment)	Delay (veh.min/segment)	Mean Arriving Vehicle Delay (min)
08:00-08:15	B-A	0.11	4.67	0.024	-	0.00	0.02	-	0.3	0.22
	B-C	0.15	8.31	0.018	-	0.00	0.02	-	0.3	0.12
	C-A	10.59	-	-	-	-	-	-	-	-
	C-B	0.13	9.18	0.014	-	0.00	0.01	-	0.2	0.11
	A-B	0.16	-	-	-	-	-	-	-	-
	A-C	14.14	-	-	-	-	-	-	-	-
08:15-08:30	B-A	0.13	3.93	0.034	-	0.02	0.03	-	0.5	0.26
	B-C	0.18	7.74	0.023	-	0.02	0.02	-	0.3	0.13
	C-A	12.65	-	-	-	-	-	-	-	-
	C-B	0.15	8.57	0.017	-	0.02	0.02	-	0.3	0.12
	A-B	0.19	-	-	-	-	-	-	-	-
	A-C	16.89	-	-	-	-	-	-	-	-
08:30-08:45	B-A	0.17	2.91	0.057	-	0.03	0.06	-	0.8	0.36
	B-C	0.22	6.93	0.032	-	0.02	0.03	-	0.5	0.15
	C-A	15.49	-	-	-	-	-	-	-	-
	C-B	0.18	7.71	0.024	-	0.02	0.02	-	0.4	0.13
	A-B	0.24	-	-	-	-	-	-	-	-
	A-C	20.68	-	-	-	-	-	-	-	-
08:45-09:00	B-A	0.17	2.91	0.057	-	0.06	0.06	-	0.9	0.36
	B-C	0.22	6.93	0.032	-	0.03	0.03	-	0.5	0.15
	C-A	15.49	-	-	-	-	-	-	-	-
	C-B	0.18	7.71	0.024	-	0.02	0.02	-	0.4	0.13
	A-B	0.24	-	-	-	-	-	-	-	-
	A-C	20.68	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/segment)	Delay (veh.min/segment)	Mean Arriving Vehicle Delay (min)
09:00-09:15	B-A	0.13	3.93	0.034	-	0.06	0.04	-	0.6	0.26
	B-C	0.18	7.74	0.023	-	0.03	0.02	-	0.4	0.13
	C-A	12.65	-	-	-	-	-	-	-	-
	C-B	0.15	8.57	0.017	-	0.02	0.02	-	0.3	0.12
	A-B	0.19	-	-	-	-	-	-	-	-
	A-C	16.89	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/segment)	Delay (veh.min/segment)	Mean Arriving Vehicle Delay (min)
09:15-09:30	B-A	0.11	4.67	0.024	-	0.04	0.03	-	0.4	0.22
	B-C	0.15	8.31	0.018	-	0.02	0.02	-	0.3	0.12
	C-A	10.59	-	-	-	-	-	-	-	-
	C-B	0.13	9.18	0.014	-	0.02	0.01	-	0.2	0.11
	A-B	0.16	-	-	-	-	-	-	-	-
	A-C	14.14	-	-	-	-	-	-	-	-

Demand Set: AM 2013 + Dev
Modelling Period: 08:00-09:30

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/segment)	Delay (veh.min/segment)	Mean Arriving Vehicle Delay (min)
08:00-08:15	B-A	0.16	4.54	0.036	-	0.00	0.04	-	0.5	0.23
	B-C	0.21	8.16	0.026	-	0.00	0.03	-	0.4	0.13
	C-A	10.83	-	-	-	-	-	-	-	-
	C-B	0.18	9.04	0.019	-	0.00	0.02	-	0.3	0.11
	A-B	0.24	-	-	-	-	-	-	-	-
	A-C	14.71	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/segment)	Delay (veh.min/segment)	Mean Arriving Vehicle Delay (min)
08:15-08:30	B-A	0.19	3.76	0.052	-	0.04	0.05	-	0.8	0.28
	B-C	0.25	7.55	0.034	-	0.03	0.03	-	0.5	0.14
	C-A	12.93	-	-	-	-	-	-	-	-
	C-B	0.21	8.40	0.025	-	0.02	0.03	-	0.4	0.12
	A-B	0.28	-	-	-	-	-	-	-	-
	A-C	17.56	-	-	-	-	-	-	-	-



Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/segment)	Delay (veh.min/segment)	Mean Arriving Vehicle Delay (min)
08:30-08:45	B-A	0.24	2.69	0.089	-	0.05	0.09	-	1.3	0.41
	B-C	0.31	6.70	0.047	-	0.03	0.05	-	0.7	0.16
	C-A	15.84	-	-	-	-	-	-	-	-
	C-B	0.26	7.50	0.034	-	0.03	0.04	-	0.5	0.14
	A-B	0.35	-	-	-	-	-	-	-	-
	A-C	21.51	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/segment)	Delay (veh.min/segment)	Mean Arriving Vehicle Delay (min)
08:45-09:00	B-A	0.24	2.69	0.089	-	0.09	0.10	-	1.4	0.41
	B-C	0.31	6.69	0.047	-	0.05	0.05	-	0.7	0.16
	C-A	15.84	-	-	-	-	-	-	-	-
	C-B	0.26	7.50	0.034	-	0.04	0.04	-	0.5	0.14
	A-B	0.35	-	-	-	-	-	-	-	-
	A-C	21.51	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/segment)	Delay (veh.min/segment)	Mean Arriving Vehicle Delay (min)
09:00-09:15	B-A	0.19	3.76	0.052	-	0.10	0.06	-	0.9	0.28
	B-C	0.25	7.55	0.034	-	0.05	0.04	-	0.5	0.14
	C-A	12.93	-	-	-	-	-	-	-	-
	C-B	0.21	8.40	0.025	-	0.04	0.03	-	0.4	0.12
	A-B	0.28	-	-	-	-	-	-	-	-
	A-C	17.56	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/segment)	Delay (veh.min/segment)	Mean Arriving Vehicle Delay (min)
09:15-09:30	B-A	0.16	4.53	0.036	-	0.06	0.04	-	0.6	0.23
	B-C	0.21	8.16	0.026	-	0.04	0.03	-	0.4	0.13
	C-A	10.83	-	-	-	-	-	-	-	-
	C-B	0.18	9.04	0.019	-	0.03	0.02	-	0.3	0.11
	A-B	0.24	-	-	-	-	-	-	-	-
	A-C	14.71	-	-	-	-	-	-	-	-



Demand Set: AM 2028
Modelling Period: 08:00-09:30

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/segment)	Delay (veh.min/segment)	Mean Arriving Vehicle Delay (min)
08:00-08:15	B-A	0.11	3.49	0.032	-	0.00	0.03	-	0.5	0.30
	B-C	0.15	7.40	0.020	-	0.00	0.02	-	0.3	0.14
	C-A	13.92	-	-	-	-	-	-	-	-
	C-B	0.13	8.19	0.015	-	0.00	0.02	-	0.2	0.12
	A-B	0.16	-	-	-	-	-	-	-	-
	A-C	18.60	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/segment)	Delay (veh.min/segment)	Mean Arriving Vehicle Delay (min)
08:15-08:30	B-A	0.13	2.51	0.054	-	0.03	0.06	-	0.8	0.42
	B-C	0.18	6.64	0.027	-	0.02	0.03	-	0.4	0.15
	C-A	16.62	-	-	-	-	-	-	-	-
	C-B	0.15	7.38	0.020	-	0.02	0.02	-	0.3	0.14
	A-B	0.19	-	-	-	-	-	-	-	-
	A-C	22.20	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/segment)	Delay (veh.min/segment)	Mean Arriving Vehicle Delay (min)
08:30-08:45	B-A	0.17	1.17	0.141	-	0.06	0.15	-	2.0	0.98
	B-C	0.22	5.51	0.040	-	0.03	0.04	-	0.6	0.19
	C-A	20.35	-	-	-	-	-	-	-	-
	C-B	0.18	6.26	0.029	-	0.02	0.03	-	0.4	0.16
	A-B	0.24	-	-	-	-	-	-	-	-
	A-C	27.20	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/segment)	Delay (veh.min/segment)	Mean Arriving Vehicle Delay (min)
08:45-09:00	B-A	0.17	1.17	0.141	-	0.15	0.16	-	2.3	0.99
	B-C	0.22	5.50	0.040	-	0.04	0.04	-	0.6	0.19
	C-A	20.35	-	-	-	-	-	-	-	-
	C-B	0.18	6.26	0.029	-	0.03	0.03	-	0.4	0.16
	A-B	0.24	-	-	-	-	-	-	-	-
	A-C	27.20	-	-	-	-	-	-	-	-



Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/segment)	Delay (veh.min/segment)	Mean Arriving Vehicle Delay (min)
09:00-09:15	B-A	0.13	2.51	0.054	-	0.16	0.06	-	1.0	0.42
	B-C	0.18	6.63	0.027	-	0.04	0.03	-	0.4	0.16
	C-A	16.62	-	-	-	-	-	-	-	-
	C-B	0.15	7.38	0.020	-	0.03	0.02	-	0.3	0.14
	A-B	0.19	-	-	-	-	-	-	-	-
	A-C	22.20	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/segment)	Delay (veh.min/segment)	Mean Arriving Vehicle Delay (min)
09:15-09:30	B-A	0.11	3.48	0.032	-	0.06	0.03	-	0.5	0.30
	B-C	0.15	7.40	0.020	-	0.03	0.02	-	0.3	0.14
	C-A	13.92	-	-	-	-	-	-	-	-
	C-B	0.13	8.19	0.015	-	0.02	0.02	-	0.2	0.12
	A-B	0.16	-	-	-	-	-	-	-	-
	A-C	18.60	-	-	-	-	-	-	-	-



Demand Set: AM 2028 + Dev
Modelling Period: 08:00-09:30

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/segment)	Delay (veh.min/segment)	Mean Arriving Vehicle Delay (min)
08:00-08:15	B-A	0.16	3.34	0.049	-	0.00	0.05	-	0.7	0.31
	B-C	0.21	7.24	0.029	-	0.00	0.03	-	0.4	0.14
	C-A	14.15	-	-	-	-	-	-	-	-
	C-B	0.18	8.05	0.022	-	0.00	0.02	-	0.3	0.13
	A-B	0.24	-	-	-	-	-	-	-	-
	A-C	19.16	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/segment)	Delay (veh.min/segment)	Mean Arriving Vehicle Delay (min)
08:15-08:30	B-A	0.19	2.34	0.083	-	0.05	0.09	-	1.2	0.46
	B-C	0.25	6.44	0.040	-	0.03	0.04	-	0.6	0.16
	C-A	16.90	-	-	-	-	-	-	-	-
	C-B	0.21	7.21	0.029	-	0.02	0.03	-	0.4	0.14
	A-B	0.28	-	-	-	-	-	-	-	-
	A-C	22.88	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/segment)	Delay (veh.min/segment)	Mean Arriving Vehicle Delay (min)
08:30-08:45	B-A	0.24	0.95	0.250	-	0.09	0.30	-	3.8	1.35
	B-C	0.31	5.16	0.060	-	0.04	0.06	-	0.9	0.21
	C-A	20.70	-	-	-	-	-	-	-	-
	C-B	0.26	6.06	0.042	-	0.03	0.04	-	0.6	0.17
	A-B	0.35	-	-	-	-	-	-	-	-
	A-C	28.02	-	-	-	-	-	-	-	-
08:45-09:00	B-A	0.24	0.95	0.250	-	0.30	0.32	-	4.6	1.40
	B-C	0.31	5.14	0.061	-	0.06	0.06	-	1.0	0.21
	C-A	20.70	-	-	-	-	-	-	-	-
	C-B	0.26	6.06	0.042	-	0.04	0.04	-	0.7	0.17
	A-B	0.35	-	-	-	-	-	-	-	-
	A-C	28.02	-	-	-	-	-	-	-	-
09:00-09:15	B-A	0.19	2.34	0.083	-	0.32	0.09	-	1.6	0.47
	B-C	0.25	6.43	0.040	-	0.06	0.04	-	0.6	0.16
	C-A	16.90	-	-	-	-	-	-	-	-
	C-B	0.21	7.21	0.029	-	0.04	0.03	-	0.5	0.14
	A-B	0.28	-	-	-	-	-	-	-	-
	A-C	22.88	-	-	-	-	-	-	-	-
09:15-09:30	B-A	0.16	3.34	0.049	-	0.09	0.05	-	0.8	0.32
	B-C	0.21	7.24	0.029	-	0.04	0.03	-	0.5	0.14
	C-A	14.15	-	-	-	-	-	-	-	-
	C-B	0.18	8.05	0.022	-	0.03	0.02	-	0.3	0.13
	A-B	0.24	-	-	-	-	-	-	-	-
	A-C	19.16	-	-	-	-	-	-	-	-

Entry capacities marked with an '(X)' are dominated by a pedestrian crossing in that time segment.
 In time segments marked with a '(B)', traffic leaving the junction may block back from a crossing so impairing normal operation of the junction.
 Delays marked with '##' could not be calculated.



Overall Queues & Delays

Queueing Delay Information Over Whole Period

Demand Set: Existing AM
Modelling Period: 08:00-09:30

Stream	Total Demand (veh)	Total Demand (veh/h)	Queueing Delay (min)	Queueing Delay (min/veh)	Inclusive Delay (min)	Inclusive Delay (min/veh)
B-A	12.4	8.3	3.5	0.3	3.5	0.3
B-C	16.5	11.0	2.2	0.1	2.2	0.1
C-A	1161.7	774.5	-	-	-	-
C-B	13.8	9.2	1.7	0.1	1.7	0.1
A-B	17.9	11.9	-	-	-	-
A-C	1551.2	1034.2	-	-	-	-
All	2773.5	1849.0	7.4	0.0	7.4	0.0

Demand Set: AM 2013 + Dev
Modelling Period: 08:00-09:30

Stream	Total Demand (veh)	Total Demand (veh/h)	Queueing Delay (min)	Queueing Delay (min/veh)	Inclusive Delay (min)	Inclusive Delay (min/veh)
B-A	17.9	11.9	5.5	0.3	5.5	0.3
B-C	23.4	15.6	3.3	0.1	3.3	0.1
C-A	1187.9	791.9	-	-	-	-
C-B	19.3	12.8	2.4	0.1	2.4	0.1
A-B	26.2	17.4	-	-	-	-
A-C	1613.2	1075.4	-	-	-	-
All	2887.7	1925.2	11.2	0.0	11.2	0.0

Demand Set: AM 2028
Modelling Period: 08:00-09:30

Stream	Total Demand (veh)	Total Demand (veh/h)	Queueing Delay (min)	Queueing Delay (min/veh)	Inclusive Delay (min)	Inclusive Delay (min/veh)
B-A	12.4	8.3	7.1	0.6	7.1	0.6
B-C	16.5	11.0	2.7	0.2	2.7	0.2
C-A	1526.5	1017.6	-	-	-	-
C-B	13.8	9.2	2.0	0.1	2.0	0.1
A-B	17.9	11.9	-	-	-	-
A-C	2039.9	1359.9	-	-	-	-
All	3626.9	2417.9	11.8	0.0	11.8	0.0



Demand Set: AM 2028 + Dev
Modelling Period: 08:00-09:30

Stream	Total Demand (veh)	Total Demand (veh/h)	Queueing Delay (min)	Queueing Delay (min/veh)	Inclusive Delay (min)	Inclusive Delay (min/veh)
B-A	17.9	11.9	12.8	0.7	12.8	0.7
B-C	23.4	15.6	4.0	0.2	4.0	0.2
C-A	1552.6	1035.1	-	-	-	-
C-B	19.3	12.8	2.9	0.1	2.9	0.1
A-B	26.2	17.4	-	-	-	-
A-C	2101.8	1401.2	-	-	-	-
All	3741.1	2494.1	19.7	0.0	19.7	0.0

Delay is that occurring only within the time period.
 Inclusive delay includes delay suffered by vehicles which are still queuing after the end of the time period.
 These will only be significantly different if there is a large queue remaining at the end of the time period.

PICADY 5 Run Successful

For inspection purposes only.
 Consent of copyright owner required for any other use.



PICADY

GUI Version: 5.00 AC
Analysis Program Release: 3.0 INTERIM (MAR 2006)

© Copyright TRL Limited, 2006
Adapted from PICADY/3 which is Crown Copyright by permission of the controller of HMSO

For sales and distribution information, program advice and maintenance, contact:

TRL Limited
Crowthorne House
Nine Mile Ride
Wokingham, Berks.
RG40 3GA, UK



Tel: +44 (0)1344 770758
Fax: +44 (0)1344 770864
E-mail: softwarebureau@trl.co.uk
Web: www.trlsoftware.co.uk

The user of this computer program for the solution of an engineering problem is in no way relieved of their responsibility for the correctness of the solution

Run Analysis

Parameter	Values
File Run	W:\Projects\7097 - TIA Limerick WMF\05-Design\01-Calculations\PICADY\7097-PM.vpi
Date Run	12 February 2013
Time Run	12:04:42
Driving Side	Drive On The Left

Arm Names and Flow Scaling Factors

Arm	Arm Name	Flow Scaling Factor (%)
Arm A	N69 to Askeaton	100
Arm B	Development	100
Arm C	N69 to Limerick	100

Stream Labelling Convention

Stream A-B contains traffic going from A to B etc.

Run Information

Parameter	Values
Run Title	7097-Dock Road
Location	Limerick
Date	08 February 2013
Enumerator	Brendan Ward [DUB-35LJ52J-BW]
Job Number	7097
Status	TIA
Client	Greenstar
Description	-



Errors and Warnings

Parameter	Values
Warning	No Errors Or Warnings

Geometric Data

Geometric Parameters

Parameter	Minor Arm B
Major Road Carriageway Width (m)	11.20
Major Road Kerbed Central Reserve Width (m)	0.00
Major Road Right Turning Lane Width (m)	3.80
Minor Road Width 0m Back from Junction (m)	10.00
Minor Road Width 5m Back from Junction (m)	8.00
Minor Road Width 10m Back from Junction (m)	6.00
Minor Road Width 15m Back from Junction (m)	3.00
Minor Road Width 20m Back from Junction (m)	3.00
Minor Road Derived Flare Length (PCU)	2.000
Minor Road Visibility To Right (m)	0
Minor Road Visibility To Left (m)	0
Major Road Right Turn Visibility (m)	100
Major Road Right Turn Blocks Traffic	No

Slope and Intercept Values

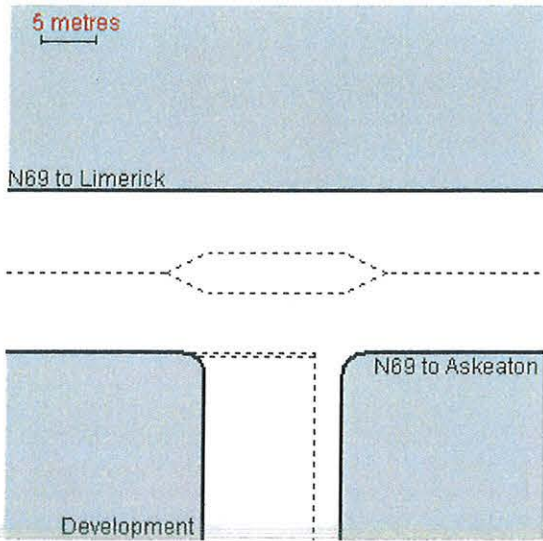
Stream	Intercept for Stream B-A	Slope for A-B	Slope for A-C	Slope for C-A	Slope for C-B
B-A	439.579	0.062	0.157	0.099	0.224
B-C	573.963	0.068	0.172	-	-
C-B	741.905	0.222	0.222	-	-

Note: Streams may be combined in which case capacity will be adjusted
 These values do not allow for any site-specific corrections



For inspection purposes only. Consent of copyright owner required for any other use.

Junction Diagram



Demand Data

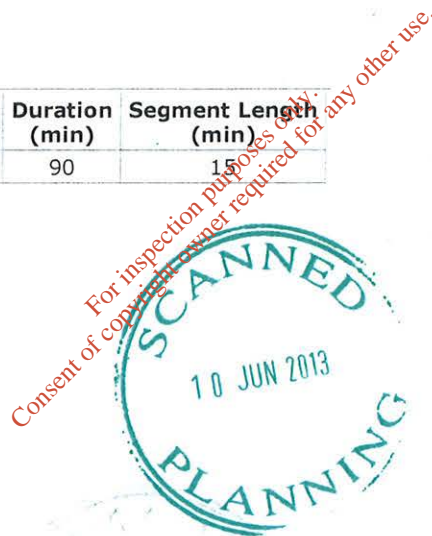
Modelling Periods

Parameter	Period	Duration (min)	Segment Length (min)
First Modelling Period	16:30-18:00	90	15

ODTAB Turning Counts

Demand Set: Existing PM
Modelling Period: 16:30-18:00

From/To	Arm A	Arm B	Arm C
Arm A	0.0	13.0	809.0
Arm B	23.0	0.0	17.0
Arm C	1176.0	14.0	0.0



Demand Set: PM 2013 + Dev
Modelling Period: 16:30-18:00

From/To	Arm A	Arm B	Arm C
Arm A	0.0	19.0	856.0
Arm B	33.0	0.0	25.0
Arm C	1202.0	20.0	0.0

Demand Set: PM 2028
Modelling Period: 16:30-18:00

From/To	Arm A	Arm B	Arm C
Arm A	0.0	13.0	1064.0
Arm B	23.0	0.0	17.0
Arm C	1547.0	14.0	0.0

Demand Set: PM 2028 + Dev
Modelling Period: 16:30-18:00

From/To	Arm A	Arm B	Arm C
Arm A	0.0	19.0	1111.0
Arm B	33.0	0.0	25.0
Arm C	1573.0	20.0	0.0

ODTAB Synthesised Flows

Demand Set: Existing PM
Modelling Period: 16:30-18:00

Arm	Rising Time	Rising Flow (veh/min)	Peak Time	Peak Flow (veh/min)	Falling Time	Falling Flow (veh/min)
Arm A	16:45	10.275	16:45	15.412	17:15	10.275
Arm B	16:45	0.500	16:45	0.750	17:15	0.500
Arm C	16:45	14.875	16:45	22.313	17:15	14.875

Heavy Vehicles Percentages

Demand Set: Existing PM
Modelling Period: 16:30-18:00

From/To	Arm A	Arm B	Arm C
Arm A	-	0.0	0.0
Arm B	0.0	-	0.0
Arm C	0.0	0.0	-

For inspection purposes only. Consent of copyright owner required for any other use.



Demand Set: PM 2013 + Dev
Modelling Period: 16:30-18:00

From/To	Arm A	Arm B	Arm C
Arm A	-	0.0	0.0
Arm B	0.0	-	0.0
Arm C	0.0	0.0	-

Demand Set: PM 2028
Modelling Period: 16:30-18:00

From/To	Arm A	Arm B	Arm C
Arm A	-	0.0	0.0
Arm B	0.0	-	0.0
Arm C	0.0	0.0	-

Demand Set: PM 2028 + Dev
Modelling Period: 16:30-18:00

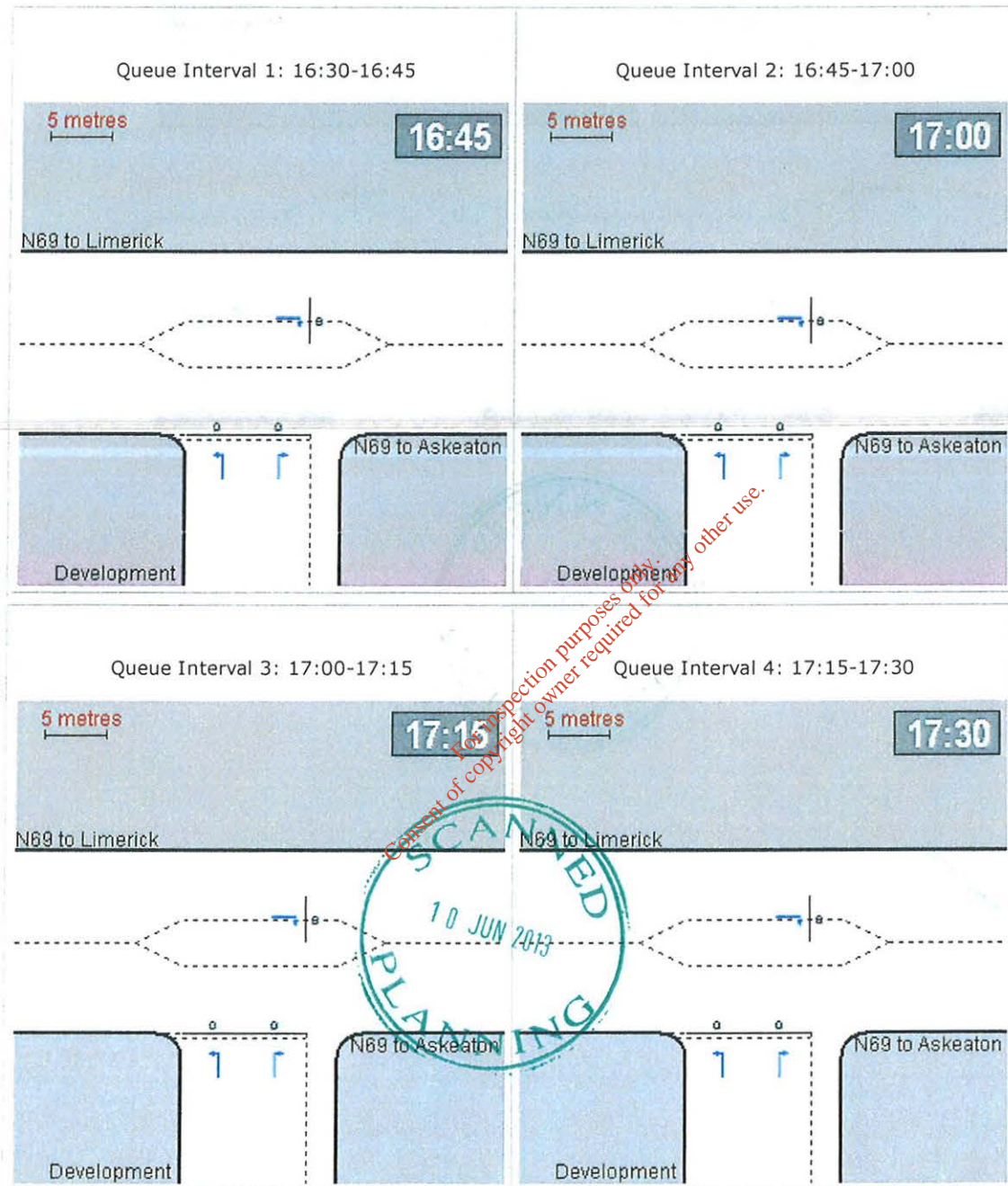
From/To	Arm A	Arm B	Arm C
Arm A	-	0.0	0.0
Arm B	0.0	-	0.0
Arm C	0.0	0.0	-

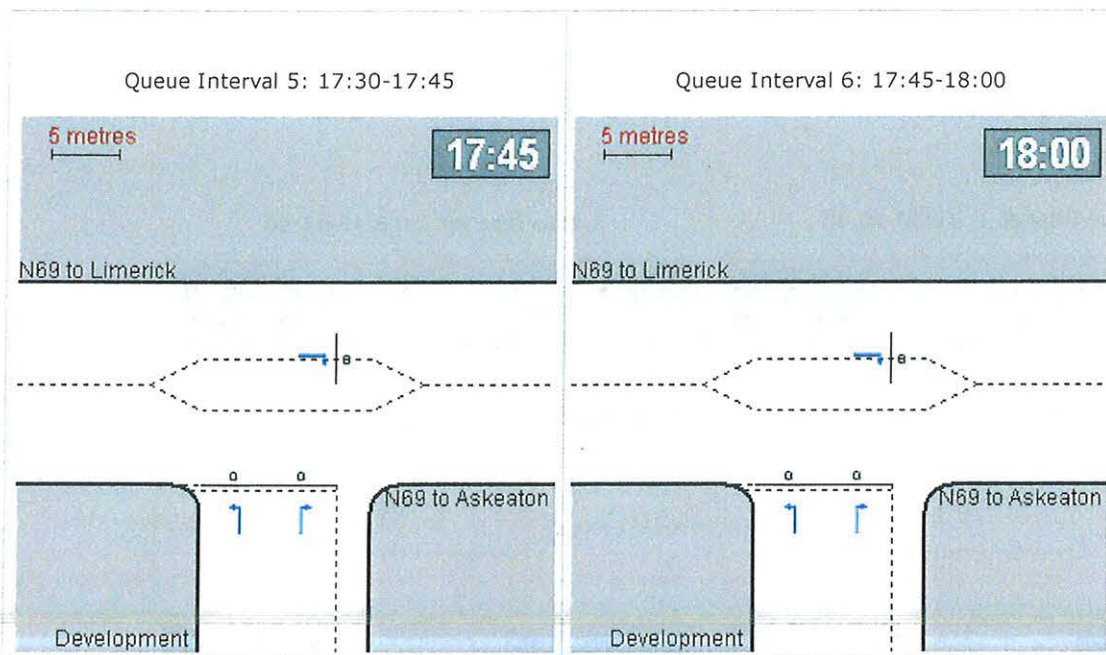


For inspection purposes only.
 Consent of copyright owner required for any other use.

Queue Diagrams

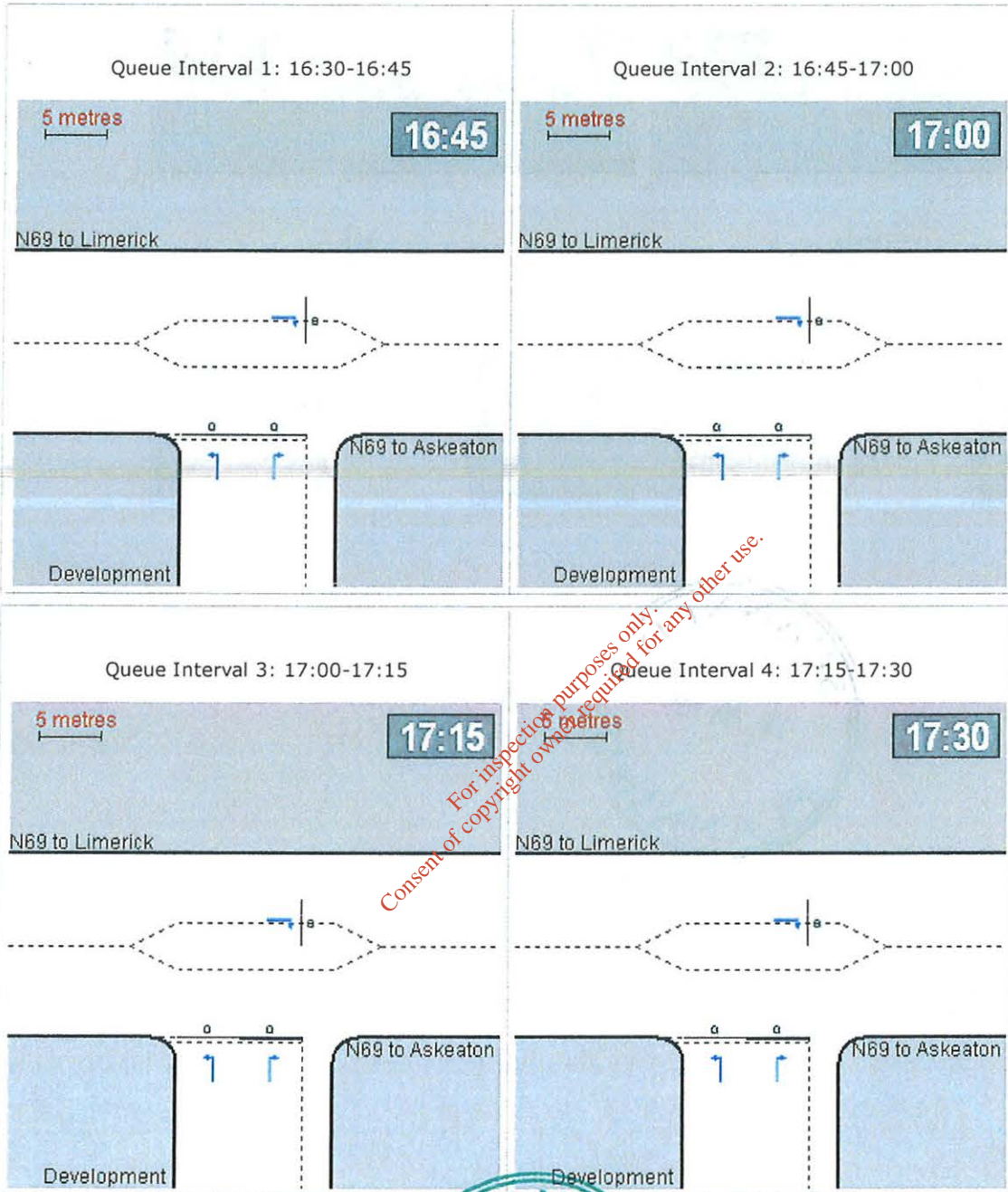
Demand Set: Existing PM
Modelling Period: 16:30-18:00
View Extent: 40m

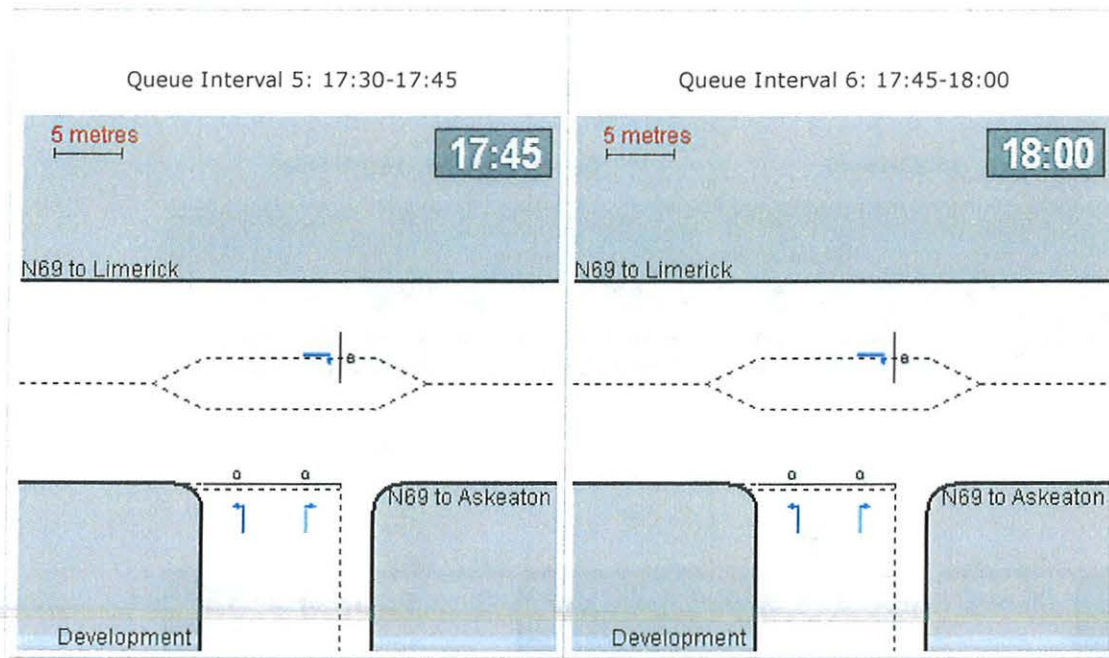




For inspection purposes only.
Consent of copyright owner required for any other use.

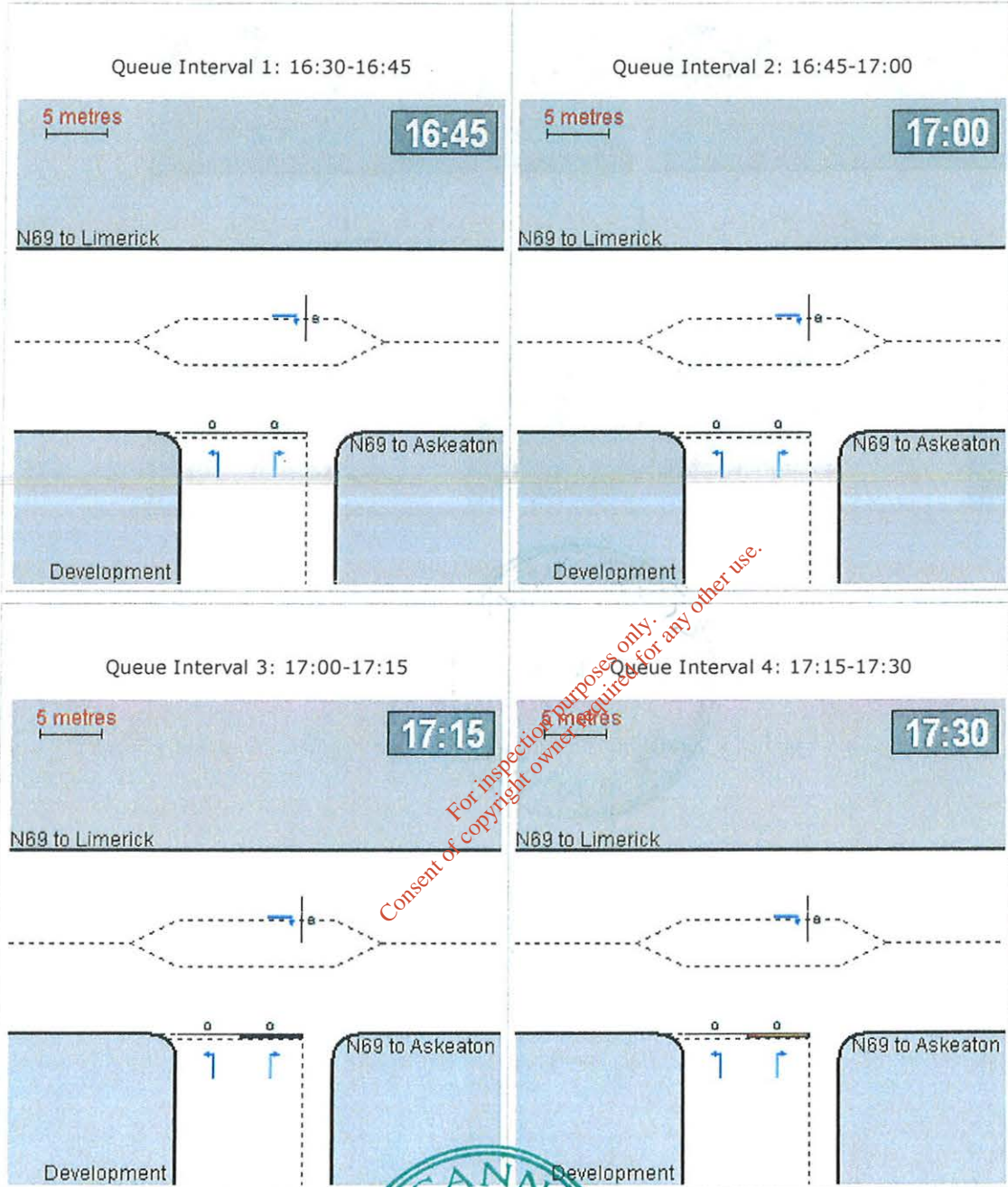
Demand Set: PM 2013 + Dev
Modelling Period: 16:30-18:00
View Extent: 40m



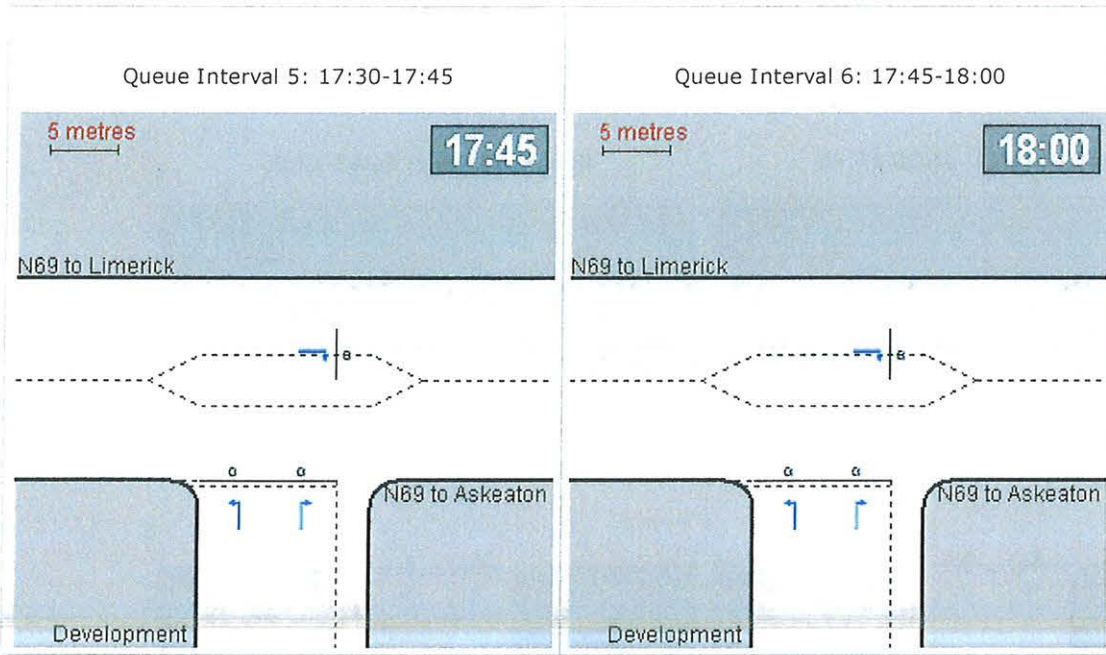


For inspection purposes only.
Consent of copyright owner required for any other use.

Demand Set: PM 2028
Modelling Period: 16:30-18:00
View Extent: 40m

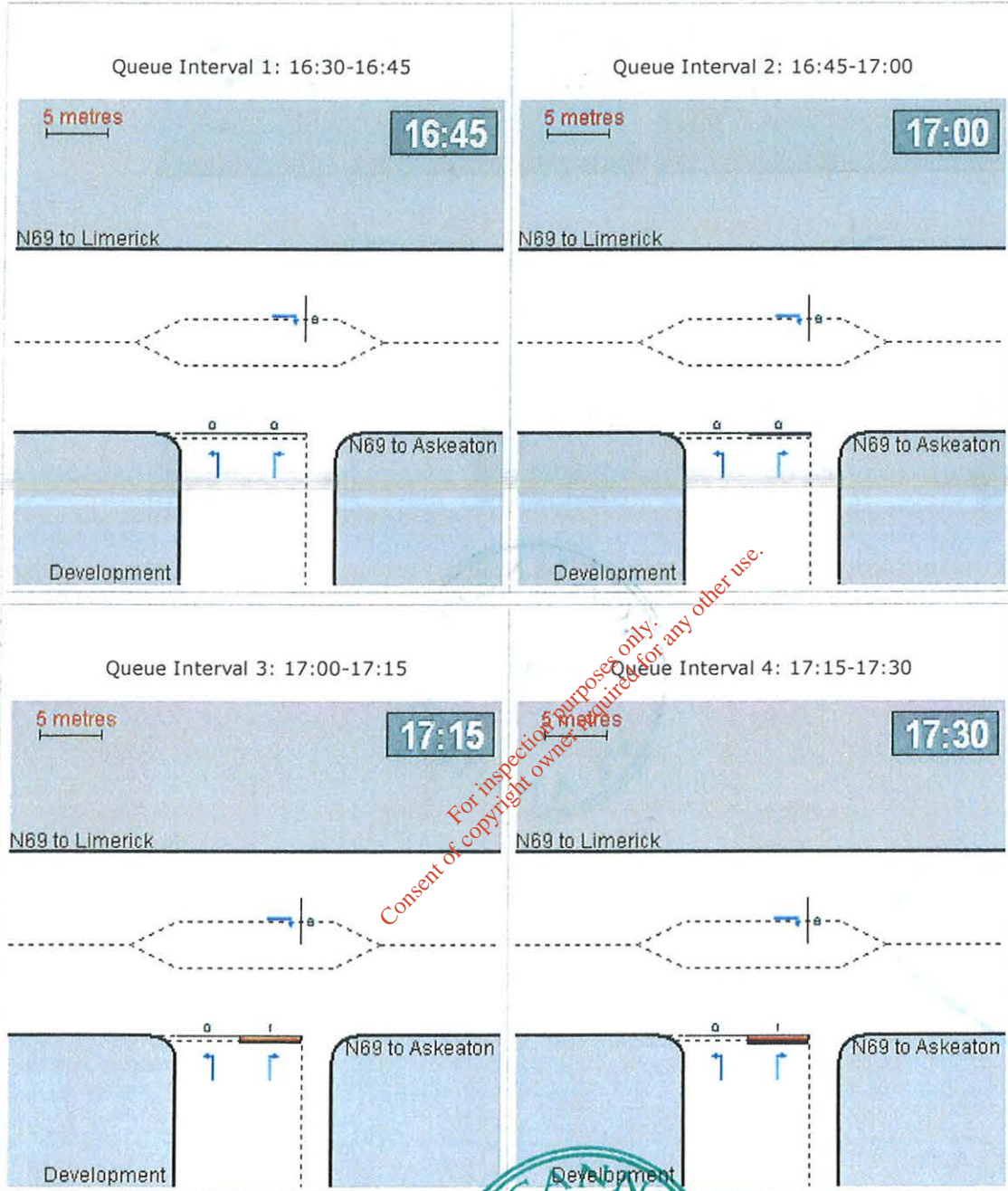


For inspection purposes only.
Consent of copyright owner required for any other use.



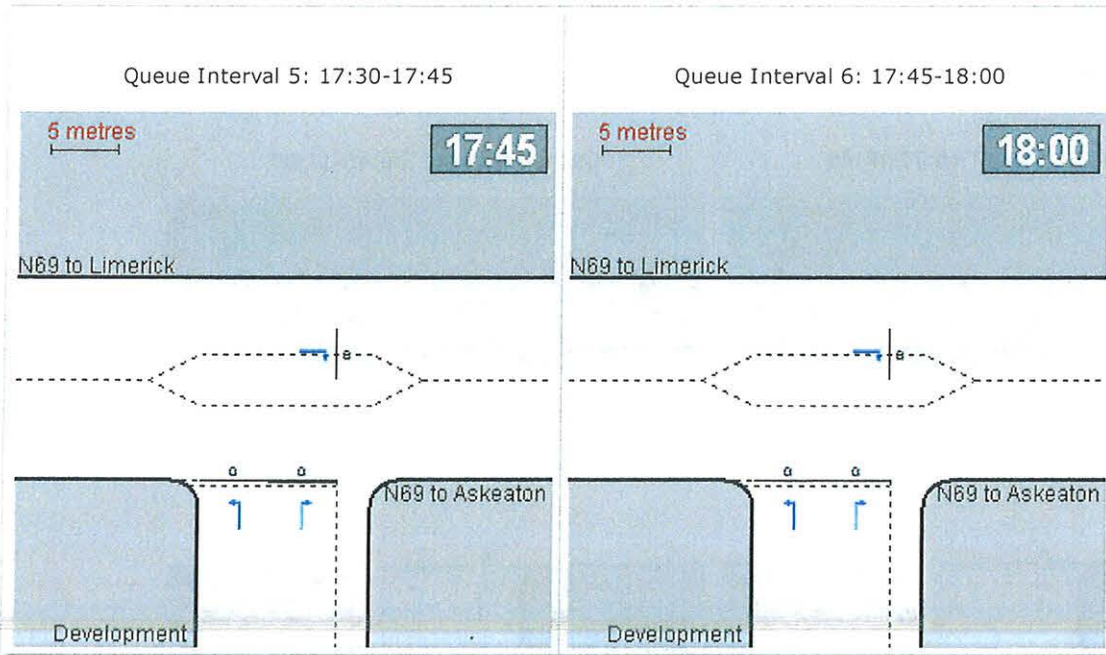
SCANNED
10 JUN 2013
PLANNING
For inspection purposes only.
Consent of copyright owner required for any other use.

Demand Set: PM 2028 + Dev
Modelling Period: 16:30-18:00
View Extent: 40m



For inspection purposes only.
Consent of copyright owner required for any other use.



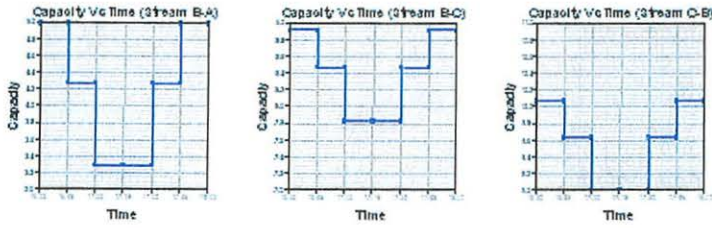


SCANNED
18 JUN 2013
PLANNING
For inspection purposes only.
Consent of copyright owner required for any other use.

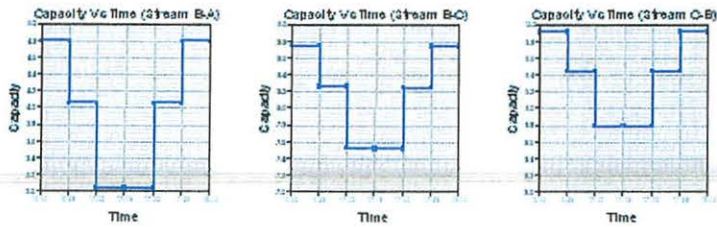


Capacity Graph

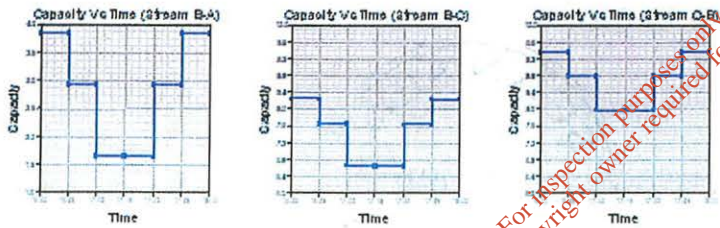
Demand Set: Existing PM
Modelling Period: 16:30-18:00



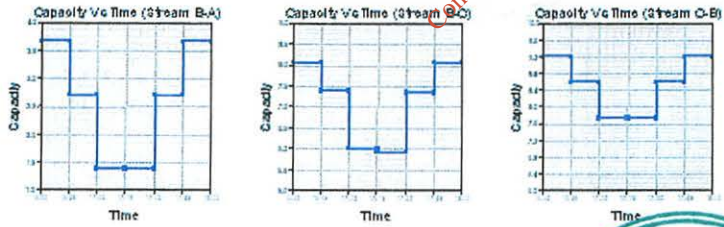
Demand Set: PM 2013 + Dev
Modelling Period: 16:30-18:00



Demand Set: PM 2028
Modelling Period: 16:30-18:00



Demand Set: PM 2028 + Dev
Modelling Period: 16:30-18:00

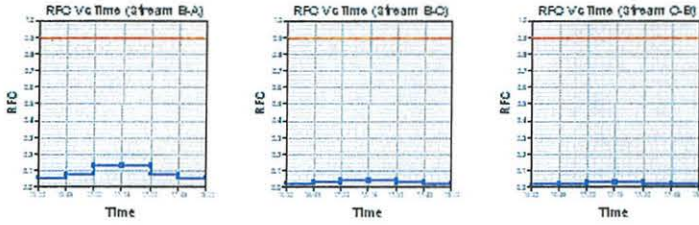


For inspection purposes only.
Consent of copyright owner required for any other use.

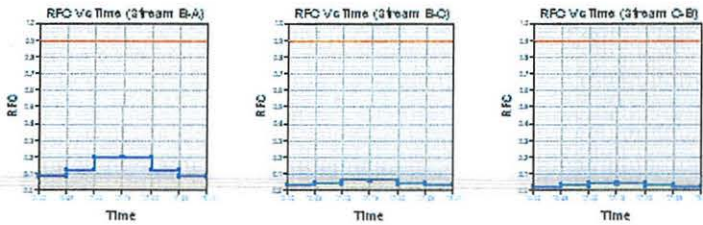


RFC Graph

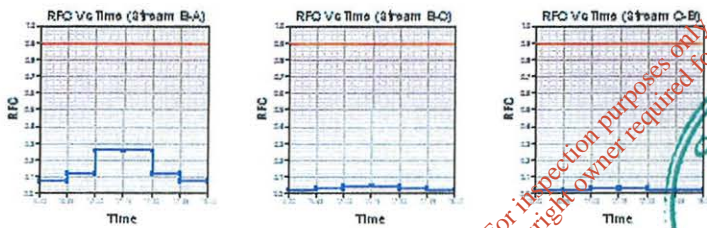
Demand Set: Existing PM
Modelling Period: 16:30-18:00



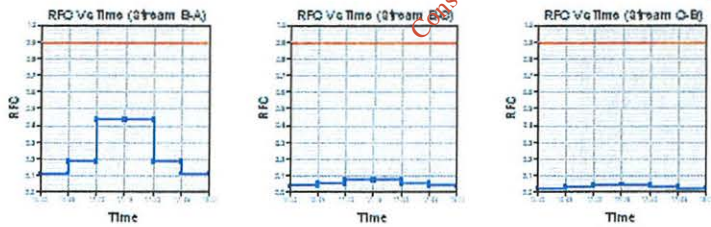
Demand Set: PM 2013 + Dev
Modelling Period: 16:30-18:00



Demand Set: PM 2028
Modelling Period: 16:30-18:00



Demand Set: PM 2028 + Dev
Modelling Period: 16:30-18:00

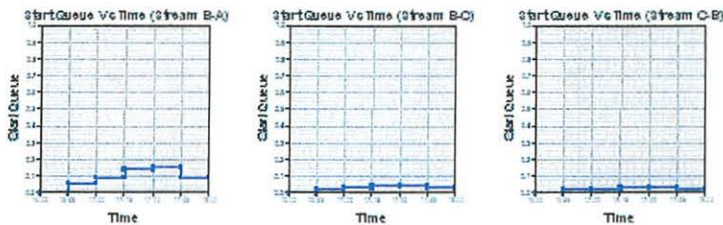


For inspection purposes only.
Consent of copyright owner required for any other use.

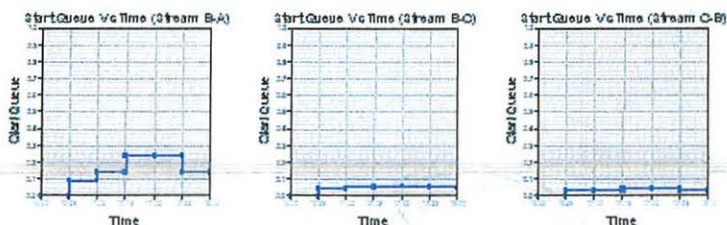


Start Queue Graph

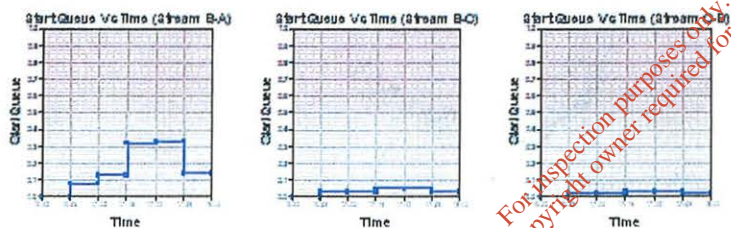
Demand Set: Existing PM
Modelling Period: 16:30-18:00



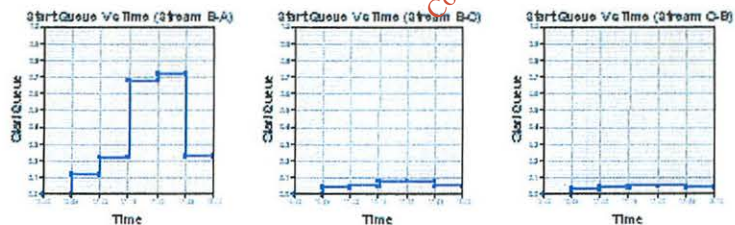
Demand Set: PM 2013 + Dev
Modelling Period: 16:30-18:00



Demand Set: PM 2028
Modelling Period: 16:30-18:00



Demand Set: PM 2028 + Dev
Modelling Period: 16:30-18:00

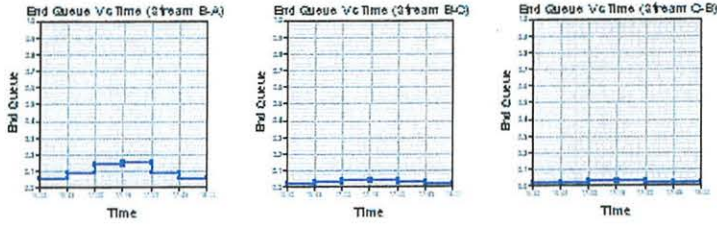


For inspection purposes only.
Consent of copyright owner required for any other use.

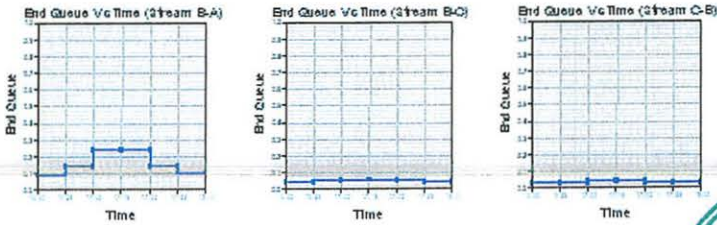


End Queue Graph

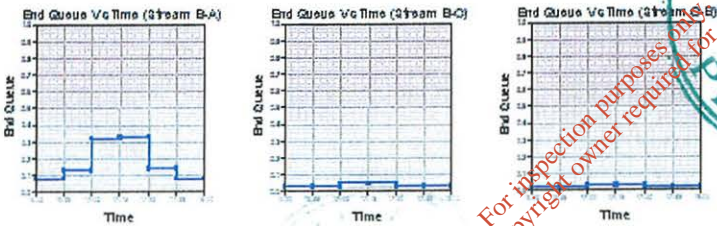
Demand Set: Existing PM
Modelling Period: 16:30-18:00



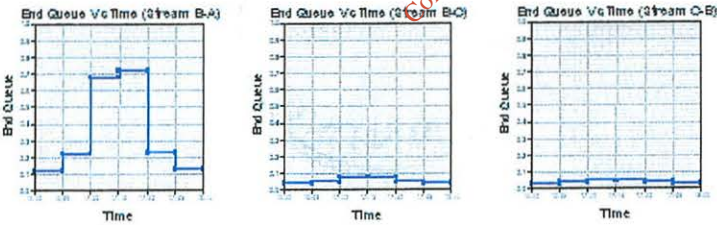
Demand Set: PM 2013 + Dev
Modelling Period: 16:30-18:00



Demand Set: PM 2028
Modelling Period: 16:30-18:00

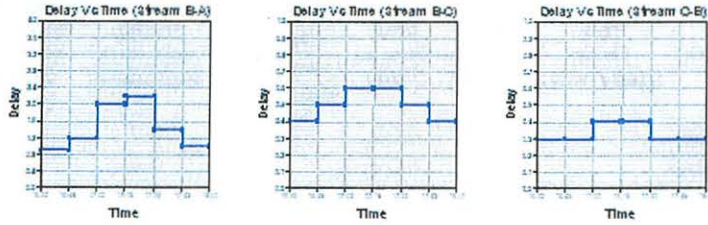


Demand Set: PM 2028 + Dev
Modelling Period: 16:30-18:00



Delay Graph

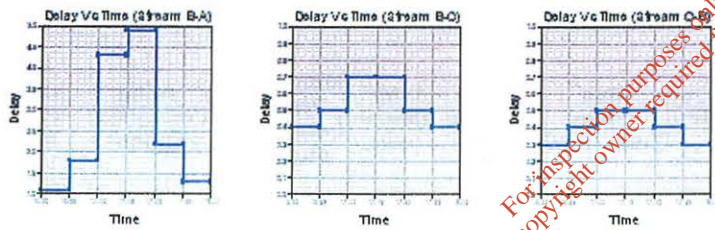
Demand Set: Existing PM
Modelling Period: 16:30-18:00



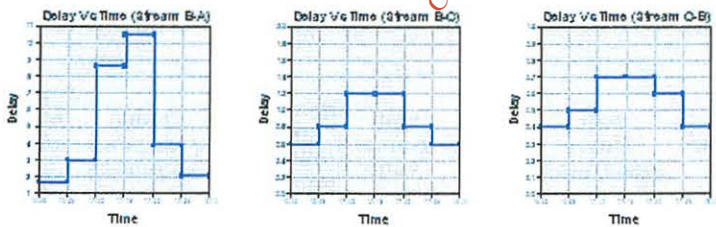
Demand Set: PM 2013 + Dev
Modelling Period: 16:30-18:00



Demand Set: PM 2028
Modelling Period: 16:30-18:00



Demand Set: PM 2028 + Dev
Modelling Period: 16:30-18:00



For inspection purposes only.
Consent of copyright owner required for any other use.

Queues & Delays

Demand Set: Existing PM
Modelling Period: 16:30-18:00

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/segment)	Delay (veh.min/segment)	Mean Arriving Vehicle Delay (min)
16:30-16:45	B-A	0.29	4.98	0.058	-	0.00	0.06	-	0.9	0.21
	B-C	0.21	8.91	0.024	-	0.00	0.02	-	0.4	0.11
	C-A	14.76	-	-	-	-	-	-	-	-
	C-B	0.18	10.07	0.017	-	0.00	0.02	-	0.3	0.10
	A-B	0.16	-	-	-	-	-	-	-	-
	A-C	10.15	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/segment)	Delay (veh.min/segment)	Mean Arriving Vehicle Delay (min)
16:45-17:00	B-A	0.34	4.27	0.081	-	0.06	0.09	-	1.2	0.25
	B-C	0.25	8.47	0.030	-	0.02	0.03	-	0.5	0.12
	C-A	17.62	-	-	-	-	-	-	-	-
	C-B	0.21	9.63	0.022	-	0.02	0.02	-	0.3	0.11
	A-B	0.19	-	-	-	-	-	-	-	-
	A-C	12.12	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/segment)	Delay (veh.min/segment)	Mean Arriving Vehicle Delay (min)
17:00-17:15	B-A	0.42	3.29	0.128	-	0.09	0.14	-	2.0	0.35
	B-C	0.31	7.83	0.040	-	0.03	0.04	-	0.6	0.13
	C-A	21.58	-	-	-	-	-	-	-	-
	C-B	0.26	9.01	0.029	-	0.02	0.03	-	0.4	0.11
	A-B	0.24	-	-	-	-	-	-	-	-
	A-C	14.85	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/segment)	Delay (veh.min/segment)	Mean Arriving Vehicle Delay (min)
17:15-17:30	B-A	0.42	3.29	0.128	-	0.14	0.15	-	2.2	0.35
	B-C	0.31	7.83	0.040	-	0.04	0.04	-	0.6	0.13
	C-A	21.58	-	-	-	-	-	-	-	-
	C-B	0.26	9.01	0.029	-	0.03	0.03	-	0.4	0.11
	A-B	0.24	-	-	-	-	-	-	-	-
	A-C	14.85	-	-	-	-	-	-	-	-



Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/segment)	Delay (veh.min/segment)	Mean Arriving Vehicle Delay (min)
17:30-17:45	B-A	0.34	4.27	0.081	-	0.15	0.09	-	1.4	0.26
	B-C	0.25	8.47	0.030	-	0.04	0.03	-	0.5	0.12
	C-A	17.62	-	-	-	-	-	-	-	-
	C-B	0.21	9.63	0.022	-	0.03	0.02	-	0.3	0.11
	A-B	0.19	-	-	-	-	-	-	-	-
	A-C	12.12	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/segment)	Delay (veh.min/segment)	Mean Arriving Vehicle Delay (min)
17:45-18:00	B-A	0.29	4.98	0.058	-	0.09	0.06	-	1.0	0.21
	B-C	0.21	8.91	0.024	-	0.03	0.02	-	0.4	0.12
	C-A	14.76	-	-	-	-	-	-	-	-
	C-B	0.18	10.07	0.017	-	0.02	0.02	-	0.3	0.10
	A-B	0.16	-	-	-	-	-	-	-	-
	A-C	10.15	-	-	-	-	-	-	-	-

Demand Set: PM 2013 + Dev
Modelling Period: 16:30-18:00

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/segment)	Delay (veh.min/segment)	Mean Arriving Vehicle Delay (min)
16:30-16:45	B-A	0.41	4.80	0.086	-	0.00	0.09	-	1.3	0.23
	B-C	0.31	8.75	0.036	-	0.00	0.04	-	0.5	0.12
	C-A	15.08	-	-	-	-	-	-	-	-
	C-B	0.25	9.99	0.025	-	0.00	0.03	-	0.4	0.10
	A-B	0.24	-	-	-	-	-	-	-	-
	A-C	10.74	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/segment)	Delay (veh.min/segment)	Mean Arriving Vehicle Delay (min)
16:45-17:00	B-A	0.49	4.06	0.122	-	0.09	0.14	-	2.0	0.28
	B-C	0.37	8.26	0.045	-	0.04	0.05	-	0.7	0.13
	C-A	18.01	-	-	-	-	-	-	-	-
	C-B	0.30	9.45	0.032	-	0.03	0.03	-	0.5	0.11
	A-B	0.28	-	-	-	-	-	-	-	-
	A-C	12.83	-	-	-	-	-	-	-	-



Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/segment)	Delay (veh.min/segment)	Mean Arriving Vehicle Delay (min)
17:00-17:15	B-A	0.61	3.04	0.199	-	0.14	0.24	-	3.4	0.41
	B-C	0.46	7.53	0.061	-	0.05	0.06	-	0.9	0.14
	C-A	22.06	-	-	-	-	-	-	-	-
	C-B	0.37	8.79	0.042	-	0.03	0.04	-	0.6	0.12
	A-B	0.35	-	-	-	-	-	-	-	-
	A-C	15.71	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/segment)	Delay (veh.min/segment)	Mean Arriving Vehicle Delay (min)
17:15-17:30	B-A	0.61	3.04	0.199	-	0.24	0.24	-	3.6	0.41
	B-C	0.46	7.52	0.061	-	0.06	0.06	-	1.0	0.14
	C-A	22.06	-	-	-	-	-	-	-	-
	C-B	0.37	8.79	0.042	-	0.04	0.04	-	0.6	0.12
	A-B	0.35	-	-	-	-	-	-	-	-
	A-C	15.71	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/segment)	Delay (veh.min/segment)	Mean Arriving Vehicle Delay (min)
17:30-17:45	B-A	0.49	4.06	0.122	-	0.24	0.14	-	2.2	0.28
	B-C	0.37	8.25	0.045	-	0.06	0.05	-	0.7	0.13
	C-A	18.01	-	-	-	-	-	-	-	-
	C-B	0.30	9.45	0.032	-	0.04	0.03	-	0.5	0.11
	A-B	0.28	-	-	-	-	-	-	-	-
	A-C	12.83	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/segment)	Delay (veh.min/segment)	Mean Arriving Vehicle Delay (min)
17:45-18:00	B-A	0.41	4.80	0.086	-	0.14	0.10	-	1.5	0.23
	B-C	0.31	8.74	0.036	-	0.05	0.04	-	0.6	0.12
	C-A	15.08	-	-	-	-	-	-	-	-
	C-B	0.25	9.92	0.025	-	0.03	0.03	-	0.4	0.10
	A-B	0.24	-	-	-	-	-	-	-	-
	A-C	10.74	-	-	-	-	-	-	-	-



For inspection purposes only. Consent of copying by owner required for any other use.

Demand Set: PM 2028
Modelling Period: 16:30-18:00

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/segment)	Delay (veh.min/segment)	Mean Arriving Vehicle Delay (min)
16:30-16:45	B-A	0.29	3.85	0.075	-	0.00	0.08	-	1.1	0.28
	B-C	0.21	8.25	0.026	-	0.00	0.03	-	0.4	0.12
	C-A	19.41	-	-	-	-	-	-	-	-
	C-B	0.18	9.36	0.019	-	0.00	0.02	-	0.3	0.11
	A-B	0.16	-	-	-	-	-	-	-	-
	A-C	13.35	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/segment)	Delay (veh.min/segment)	Mean Arriving Vehicle Delay (min)
16:45-17:00	B-A	0.34	2.92	0.118	-	0.08	0.13	-	1.8	0.39
	B-C	0.25	7.65	0.033	-	0.03	0.03	-	0.5	0.14
	C-A	23.18	-	-	-	-	-	-	-	-
	C-B	0.21	8.78	0.024	-	0.00	0.02	-	0.4	0.12
	A-B	0.19	-	-	-	-	-	-	-	-
	A-C	15.94	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/segment)	Delay (veh.min/segment)	Mean Arriving Vehicle Delay (min)
17:00-17:15	B-A	0.42	1.65	0.257	-	0.13	0.32	-	4.3	0.80
	B-C	0.31	6.67	0.047	-	0.03	0.05	-	0.7	0.16
	C-A	28.39	-	-	-	-	-	-	-	-
	C-B	0.26	7.97	0.032	-	0.02	0.03	-	0.5	0.13
	A-B	0.24	-	-	-	-	-	-	-	-
	A-C	19.52	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/segment)	Delay (veh.min/segment)	Mean Arriving Vehicle Delay (min)
17:15-17:30	B-A	0.42	1.64	0.257	-	0.32	0.33	-	4.9	0.82
	B-C	0.31	6.65	0.047	-	0.05	0.05	-	0.7	0.16
	C-A	28.39	-	-	-	-	-	-	-	-
	C-B	0.26	7.97	0.032	-	0.03	0.03	-	0.5	0.13
	A-B	0.24	-	-	-	-	-	-	-	-
	A-C	19.52	-	-	-	-	-	-	-	-



Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/segment)	Delay (veh.min/segment)	Mean Arriving Vehicle Delay (min)
17:30-17:45	B-A	0.34	2.92	0.118	-	0.33	0.14	-	2.2	0.39
	B-C	0.25	7.64	0.033	-	0.05	0.03	-	0.5	0.14
	C-A	23.18	-	-	-	-	-	-	-	-
	C-B	0.21	8.78	0.024	-	0.03	0.02	-	0.4	0.12
	A-B	0.19	-	-	-	-	-	-	-	-
	A-C	15.94	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/segment)	Delay (veh.min/segment)	Mean Arriving Vehicle Delay (min)
17:45-18:00	B-A	0.29	3.85	0.075	-	0.14	0.08	-	1.3	0.28
	B-C	0.21	8.24	0.026	-	0.03	0.03	-	0.4	0.12
	C-A	19.41	-	-	-	-	-	-	-	-
	C-B	0.18	9.36	0.019	-	0.02	0.02	-	0.3	0.11
	A-B	0.16	-	-	-	-	-	-	-	-
	A-C	13.35	-	-	-	-	-	-	-	-

Demand Set: PM 2028 + Dev
Modelling Period: 16:30-18:00

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/segment)	Delay (veh.min/segment)	Mean Arriving Vehicle Delay (min)
16:30-16:45	B-A	0.41	3.67	0.113	-	0.00	0.12	-	1.7	0.31
	B-C	0.31	8.07	0.039	-	0.00	0.04	-	0.6	0.13
	C-A	19.74	-	-	-	-	-	-	-	-
	C-B	0.25	9.2	0.027	-	0.00	0.03	-	0.4	0.11
	A-B	0.24	-	-	-	-	-	-	-	-
	A-C	13.94	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/segment)	Delay (veh.min/segment)	Mean Arriving Vehicle Delay (min)
16:45-17:00	B-A	0.49	2.71	0.182	-	0.12	0.22	-	3.0	0.45
	B-C	0.37	7.39	0.051	-	0.04	0.05	-	0.8	0.14
	C-A	23.57	-	-	-	-	-	-	-	-
	C-B	0.30	8.60	0.035	-	0.03	0.04	-	0.5	0.12
	A-B	0.28	-	-	-	-	-	-	-	-
	A-C	16.65	-	-	-	-	-	-	-	-



Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/segment)	Delay (veh.min/segment)	Mean Arriving Vehicle Delay (min)
17:00-17:15	B-A	0.61	1.39	0.435	-	0.22	0.68	-	8.6	1.19
	B-C	0.46	6.02	0.076	-	0.05	0.08	-	1.2	0.18
	C-A	28.87	-	-	-	-	-	-	-	-
	C-B	0.37	7.75	0.047	-	0.04	0.05	-	0.7	0.14
	A-B	0.35	-	-	-	-	-	-	-	-
	A-C	20.39	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/segment)	Delay (veh.min/segment)	Mean Arriving Vehicle Delay (min)
17:15-17:30	B-A	0.61	1.39	0.435	-	0.68	0.72	-	10.5	1.26
	B-C	0.46	5.93	0.077	-	0.08	0.08	-	1.2	0.18
	C-A	28.87	-	-	-	-	-	-	-	-
	C-B	0.37	7.75	0.047	-	0.05	0.05	-	0.7	0.14
	A-B	0.35	-	-	-	-	-	-	-	-
	A-C	20.39	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/segment)	Delay (veh.min/segment)	Mean Arriving Vehicle Delay (min)
17:30-17:45	B-A	0.49	2.71	0.182	-	0.72	0.23	-	3.9	0.46
	B-C	0.37	7.36	0.051	-	0.08	0.05	-	0.8	0.14
	C-A	23.57	-	-	-	-	-	-	-	-
	C-B	0.30	8.60	0.035	-	0.05	0.04	-	0.6	0.12
	A-B	0.28	-	-	-	-	-	-	-	-
	A-C	16.65	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/segment)	Delay (veh.min/segment)	Mean Arriving Vehicle Delay (min)
17:45-18:00	B-A	0.41	3.67	0.113	-	0.23	0.13	-	2.1	0.31
	B-C	0.31	8.06	0.039	-	0.05	0.04	-	0.6	0.13
	C-A	19.74	-	-	-	-	-	-	-	-
	C-B	0.25	9.21	0.027	-	0.04	0.03	-	0.4	0.11
	A-B	0.24	-	-	-	-	-	-	-	-
	A-C	13.94	-	-	-	-	-	-	-	-

Entry capacities marked with an '(X)' are dominated by a pedestrian crossing in that time segment.
 In time segments marked with a '(B)', traffic leaving the junction may block back from a crossing so impairing normal operation of the junction.
 Delays marked with '# #' could not be calculated.



Overall Queues & Delays

Queueing Delay Information Over Whole Period

Demand Set: Existing PM
Modelling Period: 16:30-18:00

Stream	Total Demand (veh)	Total Demand (veh/h)	Queueing Delay (min)	Queueing Delay (min/veh)	Inclusive Delay (min)	Inclusive Delay (min/veh)
B-A	31.7	21.1	8.7	0.3	8.7	0.3
B-C	23.4	15.6	2.9	0.1	2.9	0.1
C-A	1618.7	1079.1	-	-	-	-
C-B	19.3	12.8	2.1	0.1	2.1	0.1
A-B	17.9	11.9	-	-	-	-
A-C	1113.5	742.4	-	-	-	-
All	2824.4	1883.0	13.6	0.0	13.6	0.0

Demand Set: PM 2013 + Dev
Modelling Period: 16:30-18:00

Stream	Total Demand (veh)	Total Demand (veh/h)	Queueing Delay (min)	Queueing Delay (min/veh)	Inclusive Delay (min)	Inclusive Delay (min/veh)
B-A	45.4	30.3	14.1	0.3	14.1	0.3
B-C	34.4	22.9	4.4	0.1	4.4	0.1
C-A	1654.5	1103.0	-	-	-	-
C-B	27.5	18.4	3.0	0.1	3.0	0.1
A-B	26.2	17.4	-	-	-	-
A-C	1178.2	785.5	-	-	-	-
All	2966.2	1977.5	21.6	0.0	21.6	0.0

Demand Set: PM 2028
Modelling Period: 16:30-18:00

Stream	Total Demand (veh)	Total Demand (veh/h)	Queueing Delay (min)	Queueing Delay (min/veh)	Inclusive Delay (min)	Inclusive Delay (min/veh)
B-A	31.7	21.1	15.8	0.5	15.8	0.5
B-C	23.4	15.6	3.3	0.1	3.3	0.1
C-A	2129.3	1419.6	-	-	-	-
C-B	19.3	12.8	2.3	0.1	2.3	0.1
A-B	17.9	11.9	-	-	-	-
A-C	1464.5	976.3	-	-	-	-
All	3686.1	2457.4	21.3	0.0	21.3	0.0



Demand Set: PM 2028 + Dev
Modelling Period: 16:30-18:00

Stream	Total Demand (veh)	Total Demand (veh/h)	Queueing Delay (min)	Queueing Delay (min/veh)	Inclusive Delay (min)	Inclusive Delay (min/veh)
B-A	45.4	30.3	29.9	0.7	29.9	0.7
B-C	34.4	22.9	5.2	0.2	5.2	0.2
C-A	2165.1	1443.4	-	-	-	-
C-B	27.5	18.4	3.4	0.1	3.4	0.1
A-B	26.2	17.4	-	-	-	-
A-C	1529.2	1019.5	-	-	-	-
All	3827.8	2551.9	38.5	0.0	38.5	0.0

Delay is that occurring only within the time period.
 Inclusive delay includes delay suffered by vehicles which are still queuing after the end of the time period.
 These will only be significantly different if there is a large queue remaining at the end of the time period.

PICADY 5 Run Successful





For inspection purposes only.
Consent of copyright owner required for any other use.



TOBIN
Patrick J. Tobin & Co. Ltd.

INTERNATIONAL NETWORK

Galway
Fairgreen House,
Fairgreen Road,
Galway.
Ph +353 (0)91 565211
Fax +353 (0)91 565398
E-mail galway@tobin.ie

Dublin
Block 10-3,
Blanchardstown Corporate
Park,
Dublin 15.
Ph +353 (0)1 803 0406
Fax +353 (0)1 803 0409
E-mail dublin@tobin.ie

Castlebar
Market Square,
Castlebar,
Co. Mayo.
Ph +353 (0)94 902 1401
Fax +353 (0)94 902 1534
E-mail castlebar@tobin.ie

Poland
Ul. Cystersów 9
31-553 Kraków

Ph +48 12 353 8646
Fax +48 12 353 7329
E-mail biuro@tobin.pl

United Kingdom
CAB International,
Nosworthy Way,
Wallingford,
Oxfordshire OX10 8DE
Ph +44 1491 829327
Fax +44 1491 833508
E-mail hrian.allum@tobin.co.uk

visit us @ www.tobin.ie

Appendix 4

Flood Risk Assessment



pseudotranswallinum) occurs on cliffs near Loop Head. Cliff-top vegetation usually consists of either grassland or maritime heath. The boulder clay cliffs further up the estuary tend to be more densely vegetated, with swards of Red Fescue and species such as Kidney Vetch (*Anthyllis vulneraria*) and Bird's-foot Trefoil (*Lotus corniculatus*).

The site supports an excellent example of a large shallow inlet and bay. Littoral sediment communities in the mouth of the Shannon Estuary occur in areas that are exposed to wave action and also in areas extremely sheltered from wave action. Characteristically, exposed sediment communities are composed of coarse sand and have a sparse fauna. Species richness increases as conditions become more sheltered. All shores in the site have a zone of sand hoppers at the top and below this each of the shores has different characteristic species giving a range of different shore types in the pcSAC.

The intertidal reefs in the Shannon Estuary are exposed or moderately exposed to wave action and subject to moderate tidal streams. Known sites are steeply sloping and show a good zonation down the shore. Well developed lichen zones and littoral reef communities offering a high species richness in the sublittoral fringe and strong populations of *Paracentrotus lividus* are found. The communities found are tolerant to sand scour and tidal streams. The infralittoral reefs range from sloping platforms with some vertical steps to ridged bedrock with gullies of sand between the ridges to ridged bedrock with boulders or a mixture of cobbles, gravel and sand. Kelp is very common to about 18m. Below this it becomes rare and the community is characterised by coralline crusts and red foliose algae.

Other coastal habitats that occur within the site include the following:

- stony beaches and bedrock shores - these shores support a typical zonation of seaweeds (*Fucus* spp., *Ascophyllum nodosum* and kelps).
- shingle beaches - the more stable areas of shingle support characteristic species such as Sea Beet, Sea Mayweed (*Matricaria maritima*), Sea Campion and Curled Dock (*Rumex crispus*).
- Sandbanks which are slightly covered by sea water at all times – there is a known occurrence of sand/gravel beds in the area from Kerry Head to Beal Head.
- sand dunes - a small area of sand dunes occurs at Beal Point. The dominant species is Marram Grass (*Ammophila arenaria*).

Flowing into the estuaries are a number of tidal rivers.

Freshwater rivers have been included in the site, most notably the Feale and Mulkear catchments, the Shannon from Killaloe to Limerick (along with some of its tributaries, including a short stretch of the Kilmastulla River), the Fergus up as far as Ennis, and the Cloon River. These systems are very different in character: the Shannon being broad, generally slow-flowing and naturally eutrophic; the Fergus being smaller and alkaline; while the narrow, fast-flowing Cloon is acid in nature. The Feale and Mulkear catchments exhibit all the aspects of a river from source to mouth. Semi-natural habitats, such as wet grassland, wet woodland and marsh occur by the rivers, however, improved grassland is most common. One grassland type of



particular conservation significance, *Molinia* meadows, occurs in several parts of the site and the examples at Worldsend on the River Shannon are especially noteworthy. Here are found areas of wet meadow dominated by rushes and sedges and supporting a diverse and species-rich vegetation, including such uncommon species as Blue-eyed Grass (*Sisyrinchium bermudiana*) and Pale Sedge (*Carex pallescens*).

Floating river vegetation characterised by species of Water-crowfoot (*Ranunculus* spp.), Pondweeds (*Potamogeton* spp.) and the moss *Fontinalis antipyretica* are present throughout the major river systems within the site. The rivers contain an interesting bryoflora with *Schistidium alpicola* var. *alpicola* recorded from in-stream boulders on the Bilboa, new to county Limerick.

Alluvial woodland occurs on the banks of the Shannon and on islands in the vicinity of the University of Limerick. The woodland is up to 50m wide on the banks and somewhat wider on the largest island. The most prominent woodland type is gallery woodland where White Willow (*Salix alba*) dominates the tree layer with occasional Alder (*Alnus glutinosa*). The shrub layer consists of various willow species with sally (*Salix cinerea* ssp. *oleifolia*) and what appear to be hybrids of *S. alba* x *S. viminalis*. The herbaceous layer consists of tall perennial herbs. A fringe of Bulrush (*Typha* sp.) occurs on the riverside of the woodland. On slightly higher ground above the wet woodland and on the raised embankment remnants of mixed oak-ash-alder woodland occur. These are poorly developed and contain numerous exotic species but locally there are signs that it is invading open grassland. Alder is the principal tree species with occasional Oak (*Quercus robur*). Elm (*Ulmus glabra*, *U. procera*), Hazel (*Corylus avellana*), Hawthorn (*Crataegus monogyna*) and the shrubs Guelder-rose (*Viburnum opulus*) and willows. The ground flora is species-rich.

Woodland is infrequent within the site, however Cahiracon Wood contains a strip of old Oak woodland. Sessile Oak (*Quercus petraea*) forms the canopy, with an understorey of Hazel and Holly (*Ilex aquifolium*). Great Wood-rush (*Luzula sylvatica*) dominates the ground flora. Less common species present include Great Horsetail (*Equisetum telmateia*) and Pendulous Sedge (*Carex pendula*).

In the low hills to the south of the Slievefelim mountains, the Cahernahallia River cuts a valley through the Upper Silurian rocks. For approximately 2km south of Cappagh Bridge at Knockanavar, the valley sides are wooded. The woodland consists of Birch (*Betula* spp.), Hazel, Oak, Rowan (*Sorbus aucuparia*), some Ash (*Fraxinus excelsior*) and Willow (*Salix* spp.). Most of the valley is not grazed by stock, and as a result the trees are regenerating well. The ground flora feature prominent Greater wood-rush and Bilberry (*Vaccinium myrtillus*) with a typical range of woodland herbs. Where there is more light available, Bracken (*Pteridium aquilinum*) features.

The valley sides of the Bilboa and Gortnageragh Rivers, on higher ground north east of Cappamore, support patches of semi-natural broadleaf woodland dominated by Ash, Hazel, Oak and Birch. There is a good scrub layer with Hawthorn, Willow, Holly and Blackthorn (*Prunus spinosa*) common. The herb layer in these woodlands is often open with a typically rich mixture of woodland herbs and ferns. Moss species diversity is high. The woodlands are ungrazed. The hazel is actively coppiced in places.

There is a small area of actively regenerating cut away raised bog at Ballyrorheen. It is situated approx. 5km north west of Cappamore Co. Limerick. The bog contains some wet areas with good moss (*Sphagnum*) cover. Species of particular interest include the Cranberry (*Vaccinium oxycoccos*) and the White Sedge (*Carex curta*) along with two other regionally rare mosses including *S. fimbriatum*. The site is being invaded by Birch (*Betula pubescens*) scrub woodland. Both commercial forestry and the spread of rhododendron has greatly reduced the overall value of the site.

A number of plant species that are Irish Red Data Book species occur within the site - several are protected under the Flora (Protection) Order, 1999:

- Triangular Club-rush (*Scirpus triquetrus*) - in Ireland this protected species is only found in the Shannon Estuary, where it borders creeks in the inner estuary.
- Opposite-leaved Pondweed (*Groenlandia densa*) - this protected pondweed is found in the Shannon where it passes through Limerick City.
- Meadow Barley (*Hordeum secalinum*) - this protected species is abundant in saltmarshes at Ringmoylan and Mantlehill.
- Hairy Violet (*Viola hirta*) - this protected violet occurs in the Askeaton/Foynes area.
- Golden Dock (*Rumex maritimus*) - noted as occurring in the River Fergus Estuary.
- Bearded Stonewort (*Chara canescens*) - a brackish water specialist found in Shannon Airport lagoon.
- Convergent Stonewort (*Chara connivens*) - presence in Shannon Airport Lagoon to be confirmed.

Overall, the Shannon and Fergus Estuaries support the largest numbers of wintering waterfowl in Ireland. The highest count in 1995-96 was 51,423 while in 1994-95 it was 62,701. Species listed on Annex I of the E.U. Birds Directive which contributed to these totals include: Great Northern Diver (3; 1994/95), Whooper Swan (201; 1995/96), Pale-bellied Brent Goose (246; 1995/96), Golden Plover (11,067; 1994/95) and Bar-tailed Godwit (476; 1995/96). In the past, three separate flocks of Greenland White-fronted Goose were regularly found but none were seen in 1993/94.

Other wintering waders and wildfowl present include Greylag Goose (216; 1995/96), Shelduck (1,060; 1995/96), Wigeon (5,976; 1995/96); Teal (2,319; 1995-96); Mallard (528; 1995/96), Pintail (45; 1995/96), Shoveler (84; 1995/96), Tufted Duck (272; 1995/96), Scaup (121; 1995/96), Ringed Plover (240; 1995/96), Grey Plover (750; 1995/96), Lapwing (24,581; 1995/96), Knot (800; 1995/96), Dunlin (20,100; 1995/96), Snipe (719; 1995/96), Black-tailed Godwit (1062; 1995/96), Curlew (1504; 1995/96), Redshank (3228; 1995/96), Greenshank (36; 1995/96) and Turnstone (107; 1995/96). A number of wintering gulls are also present, including Black-headed Gull (2,216; 1995/96), Common Gull (366; 1995/96) and Lesser Black-backed Gull (100; 1994/95). This is the most important coastal site in Ireland for a number of the waders including Lapwing, Dunlin, Snipe and Redshank. It also provides an important staging ground for species such as Black-tailed Godwit and Greenshank.

A number of species listed on Annex I of the E.U. Birds Directive breed within the site. These include Peregrine Falcon (2-3 pairs), Sandwich Tern (34 pairs on Rat Island, 1995), Common Tern (15 pairs: 2 on Sturamus Island and 13 on Rat Island, 1995), Chough (14-41 pairs, 1992) and Kingfisher. Other breeding birds of note include Kittiwake (690 pairs at Loop Head, 1987) and Guillemot (4010 individuals at Loop Head, 1987)

There is a resident population of Bottle-nosed Dolphin in the Shannon Estuary consisting of at least 56-68 animals (1996). This is the only known resident population of this E.U. Habitats Directive Annex II species in Ireland. Otter, a species also listed on Annex II of this directive, is commonly found on the site.

Five species of fish listed on Annex II of the E.U. Habitats Directive are found within the site. These are Sea Lamprey (*Petromyzon marinus*), Brook Lamprey (*Lampetra planeri*), River Lamprey (*Lampetra fluviatilis*), Twaite Shad (*Allosa fallax fallax*) and Salmon (*Salmo salar*). The three lampreys and Salmon have all been observed spawning in the lower Shannon or its tributaries. The Fergus is important in its lower reaches for spring salmon while the Mulkear catchment excels as a grilse fishery though spring fish are caught on the actual Mulkear River. The Feale is important for both types. Twaite Shad is not thought to spawn within the site. There are few other river systems in Ireland which contain all three species of Lamprey.

Two additional fish of note, listed in the Irish Red Data Book, also occur, namely Smelt (*Osmerus eperlanus*) and Pollan (*Corygonus autumnalis pollan*). Only the former has been observed spawning in the Shannon.

Freshwater Pearl-mussel (*Margaritifera margaritifera*), a species listed on Annex II of the E.U. Habitats Directive, occurs abundantly in parts of the Cloon River.

There is a wide range of landuses within the site. The most common use of the terrestrial parts is grazing by cattle and some areas have been damaged through over-grazing and poaching. Much of the land adjacent to the rivers and estuaries has been improved or reclaimed and is protected by embankments (especially along the Fergus Estuary). Further, reclamation continues to pose a threat as do flood relief works (e.g. dredging of rivers). Gravel extraction poses a major threat on the Feale.

In the past, Cord-grass (*Spartina* sp.) was planted to assist in land reclamation. This has spread widely, and may oust less vigorous colonisers of mud and may also reduce the area of mudflat available to feeding birds.

Domestic and industrial wastes are discharged into the Shannon, but water quality is generally satisfactory - except in the upper estuary, reflecting the sewage load from Limerick City. Analyses for trace metals suggest a relatively clean estuary with no influences by industrial discharges apparent. Further industrial development along the Shannon and water polluting operations are potential threats.

Fishing is a main tourist attraction on the Shannon and there are a large number of Angler Associations, some with a number of beats. Fishing stands and styles have been erected in places. The River Feale is a designated Salmonid Water under the



E.U. Freshwater Fish Directive. Other uses of the site include commercial angling, oyster farming, boating (including dolphin-watching trips) and shooting. Some of these may pose threats to the birds and dolphins through disturbance. Specific threats to the dolphins include underwater acoustic disturbance, entanglement in fishing gear and collisions with fast moving craft.

This site is of great ecological interest as it contains a high number of habitats and species listed on Annexes I and II of the E.U. Habitats Directive, including the priority habitat lagoon, the only known resident population of Bottle-nosed Dolphin in Ireland and all three Irish lamprey species. A good number of Red Data Book species are also present, perhaps most notably the thriving populations of Triangular Club-rush. A number of species listed on Annex I of the E.U. Birds Directive are also present, either wintering or breeding. Indeed, the Shannon and Fergus Estuaries form the largest estuarine complex in Ireland and support more wintering wildfowl and waders than any other site in the country. Most of the estuarine part of the site has been designated a Special Protection Area (SPA), under the E.U. Birds Directive, primarily to protect the large numbers of migratory birds present in winter.

6.10.2006

*For inspection purposes only.
Consent of copyright owner required for any other use.*



SITE SYNOPSIS

SITE NAME: RIVER SHANNON AND RIVER FERGUS ESTUARIES SPA

SITE CODE: 004077

The estuaries of the River Shannon and River Fergus form the largest estuarine complex in Ireland. The site comprises all of the estuarine habitat west from Limerick City and south from Ennis, extending west as far as Killadysert and Foynes on the north and south shores respectively of the River Shannon (a distance of some 25 km from east to west). Also included are several areas in the outer Shannon estuary, notably Clonderalaw Bay and Poulnasherry Bay, as well as the intertidal areas on the south shore of the Shannon between Tarbert and Beal Point.

The site has vast expanses of intertidal flats. The main macro-invertebrate community present is a *Macoma-Scrobicularia-Nereis* community which provides a rich food resource for the wintering birds. Other species occurring include Common Cockle (*Cerastoderma edule*), Lugworm (*Arenicola marina*), the polychaete *Nephtys hombergii*, the gastropod *Hydrobia ulvae* and the crustacean *Corophium volutator*. Eelgrass (*Zostera* spp.) is present in places, along with green algae (e.g. *Ulva* spp. and *Enteromorpha* spp.). Salt marsh vegetation frequently fringes the mudflats and this provides important high tide roost areas for the wintering birds. Characteristic species occurring include Common Saltmarsh-grass (*Puccinellia maritima*), Sea Aster (*Aster tripolium*), Thrift (*Armeria maritima*), Sea-milkwort (*Glaux maritima*), Sea Plantain (*Plantago maritima*), Red Fescue (*Festuca rubra*) and Saltmarsh Rush (*Juncus gerardi*). In the innermost parts of the estuaries, the tidal channels or creeks are fringed with species such as Common Reed (*Phragmites australis*) and club-rushes (*Scirpus maritimus*, *S. lacustris* subsp. *tabernaemontani*). Also found is the nationally rare Triangular Club-rush (*Scirpus triquetus*). Elsewhere in the site the shoreline comprises stony or shingle beaches.

The site is the most important coastal wetland site in the country and regularly supports in excess of 50,000 wintering waterfowl (mean of 59,183 for the 4 seasons 1996-97 to 1999/00), a concentration easily of international importance. The site has internationally important populations of Dunlin (14,987), Black-tailed Godwit (706) and Redshank (1,983) - all figures are average peaks for 3 of the 5 seasons in the 1995/96-1999/00 period. A further 16 species have populations of national importance, i.e. Cormorant (148), Whooper Swan (141), Greylag Goose (88), Shelduck (895), Wigeon (3,025), Teal (1,558), Pintail (40), Shoveler (56), Scaup (76), Golden Plover (4,073), Grey Plover (564), Lapwing (13,007), Knot (686), Bar-tailed Godwit (481), Curlew (1,231) and Greenshank (33). The site is among the most important in the country for several of these species, notably Dunlin (11% of national total), Grey Plover (7.5% of total), Lapwing (6.5% of total), Redshank (6% of total) and Shelduck (6.0% of total). The site is also used by Oystercatcher (363), Ringed Plover (70), Brent Goose (135), Great Crested Grebe (47), Red-breasted Merganser (14), Mallard (247), Turnstone (71), Mute Swan (54), Grey Heron (25), Black-headed Gull (1,233) and Common Gull (194).



The Shannon / Fergus system was formerly frequented by a Greenland White-fronted Goose population but this declined during the 1980s and 1990s and the birds now appear to have abandoned the area. The site provides both feeding and roosting areas for the wintering birds. Habitat quality for most of the estuarine habitats is good. Some species, particularly Whooper Swan and Greylag Goose, utilise areas outside of the site for feeding.

Apart from the wintering birds, large numbers of some species also pass through the site whilst on migration in spring and/or autumn. Regular species include Black-tailed Godwit, Whimbrel and Greenshank.

Much of the land adjacent to the rivers and estuaries has been reclaimed and improved for agriculture and is protected by embankments (especially along the River Fergus estuary). Further reclamation, especially near to the urbanised and industrial areas continues to pose a threat. The site receives pollution from several sources, including industry and agriculture, but it is not known if this has any significant impacts on the wintering birds. Aquaculture occurs in some areas of the site – future increases in this activity could cause disturbance to the habitats and the associated birds. Common Cord-grass (*Spartina anglica*) is well-established and may threaten some of the estuarine habitats. Some disturbance occurs from boating activities.

This site is of great ornithological interest, being of international importance on account of the numbers of wintering birds it supports. It also supports internationally important numbers of three species, i.e. Dunlin, Black-tailed Godwit and Redshank. In addition, there are 16 species that have populations of national importance. For several of the bird species, it is the top site in the country. Also of note is that three of the species which occur regularly are listed on Annex I of the E.U. Birds Directive, i.e. Whooper Swan, Golden Plover and Bar-tailed Godwit. The site is most effectively censused from the air and this is carried out in most winters.

