MOTT MACDONALD

Canada Water OAPF

CLoHAM Base year Audit and Re-calibration

April 2017

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Contents

1 Introduction

In February 2017 Mott MacDonald were appointed by TfL and London Borough Southwark (LBS) to provide transport consultancy services for planned development in the Canada Water area. The Canada Water Opportunity Area (OA) has been identified as a key site for potential land use redevelopment to help meet London's new housing targets, which in turn are needed to sustain the levels of growth in population and employment forecast for the capital.

The purpose of this study is to provide robust evidence to support the Canada Water OA Transport Study by forecasting the impact of land use change on the transport network and testing suitable highway and public transport measures that will offer the best accessibility and capacity solutions for the OA.

This report covers the audit, re-calibration and validation of the base year highway model to improve the model representation in the study area.

2 Base Year Model

2.1 Model Provided

The following base year model was provided to Mott MacDonald by TfL on 13th March 2017:

- C3_BY12_V146NET_R003_PM_F.UFS

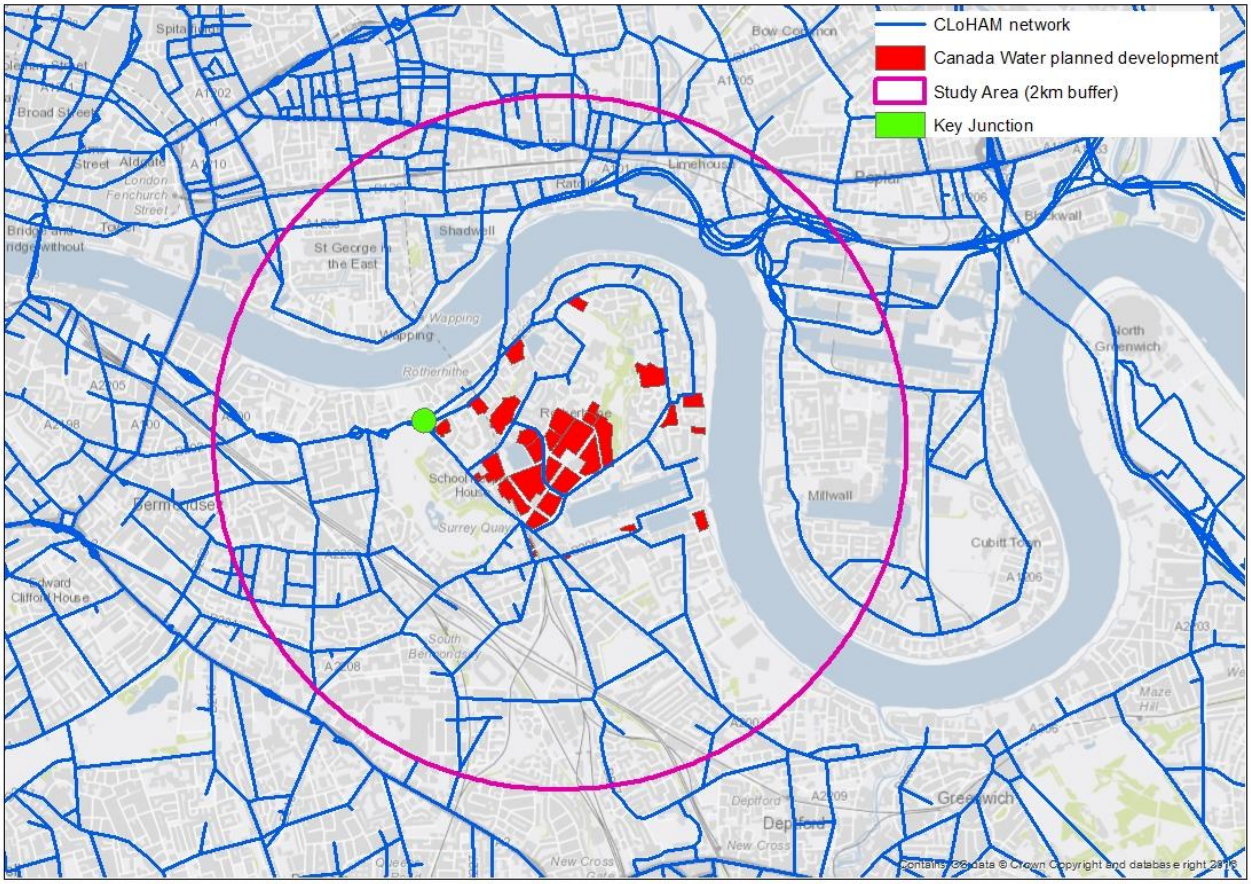
2.2 Study area

The local network structure within CLoHAM was reviewed to ensure that the highway network was well represented within and around the study area.

According to TfL's *"Sub-regional Highway Assignment Model – Guidance on Model Use Version 2.5"* section 7 *"it is advised that the study area buffers at least two kilometres around the area of the intervention being studied."* This area for Canada Water is represented in **Figure 1**.

The HAM guidance also states that *"in general, the study area should not be confined to the immediate locality of any proposed interventions as in many cases the effects will be more widespread."* The proposed interventions (planned development) in the Canada Water area are shown in red in **Figure 1**. Early plans for development in Canada Water have suggested that approximately 8,000 new homes could be introduced to the area. Due to this significant increase in potential trip generation, wider impacts will be considered beyond the immediate study area, with **Figure 2** displaying the likely extent of this consideration.

Figure 1: Canada Water Study Area



Source: Ordnance Survey data © Crown copyright and database right 2016

Figure 2: Wider Study Area

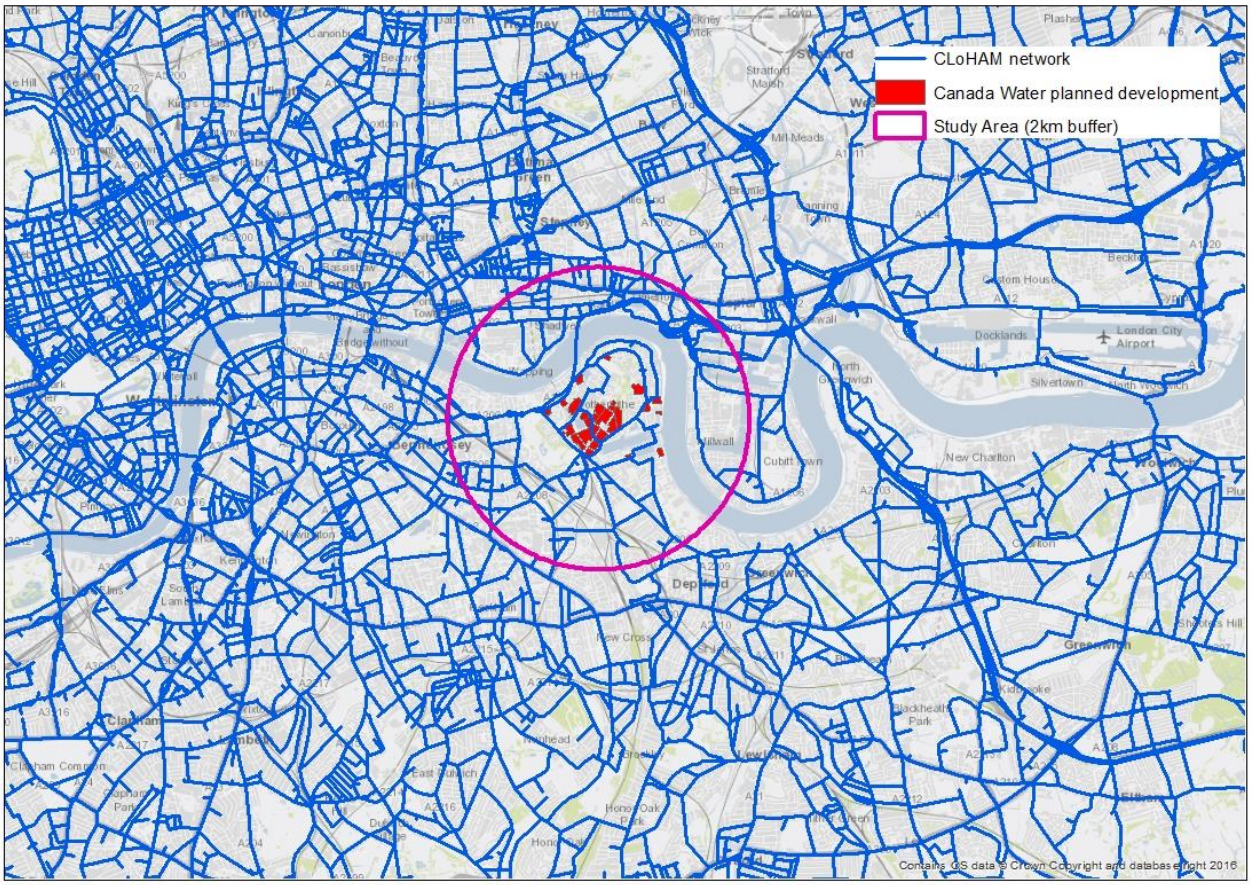


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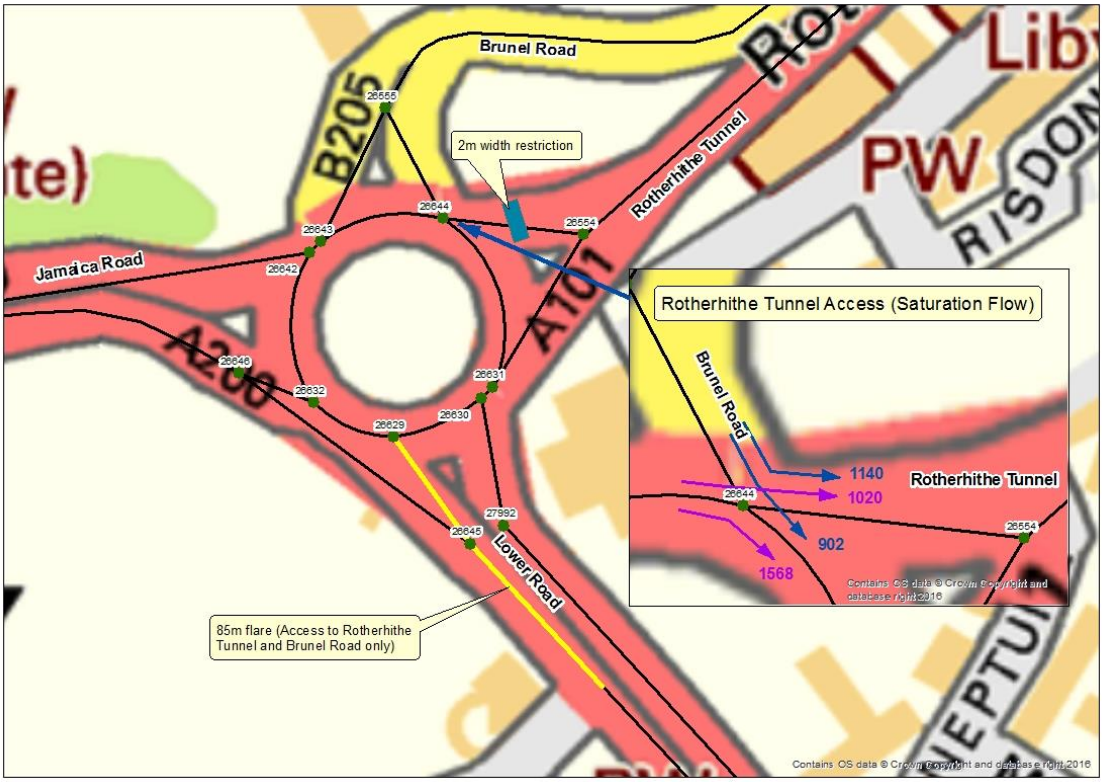
Figure 1 also displays the roundabout at the southern end of the Rotherhithe Tunnel; this junction will be a key focus of this study as all traffic using the tunnel will pass through here. The Rotherhithe Tunnel is one of very few river crossings for traffic in East London and therefore results in large volumes of traffic along Lower Road and Jamaica Road accessing the tunnel and passing through the study area. Due to these large volumes of traffic accessing the tunnel, severe queueing and delays are experienced along both Jamaica Road and Lower Road in the PM peak hour which should be accurately reflected in the model.

2.2.1 Key Junction

The key junction highlighted in **Figure 1** is shown in more detail in **Figure 3**.

Figure 3: Rotherhithe Tunnel Southern Roundabout



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The 2-metre width restriction on the approach to the Rotherhithe Tunnel also acts as a capacity restriction as vehicles slow down to pass through it and therefore limits the traffic flow that can pass through here in the PM peak hour. Saturation flows of 1140 pcu/hr and 1020 pcu/hr are currently in place in the base year for all time periods, as displayed above in **Figure 3**, but these may be adjusted to achieve a more realistic reflection of capacity on this link, including the adjustment of the saturation flow at node number 26554. However, as it is a link based capacity restriction, speed flow curves may be appropriate to emulate the restriction also.

All network adjustments suggested above will be tested in the model and results will be compared against flows and journey times on and around the roundabout to achieve good validation of the model here.

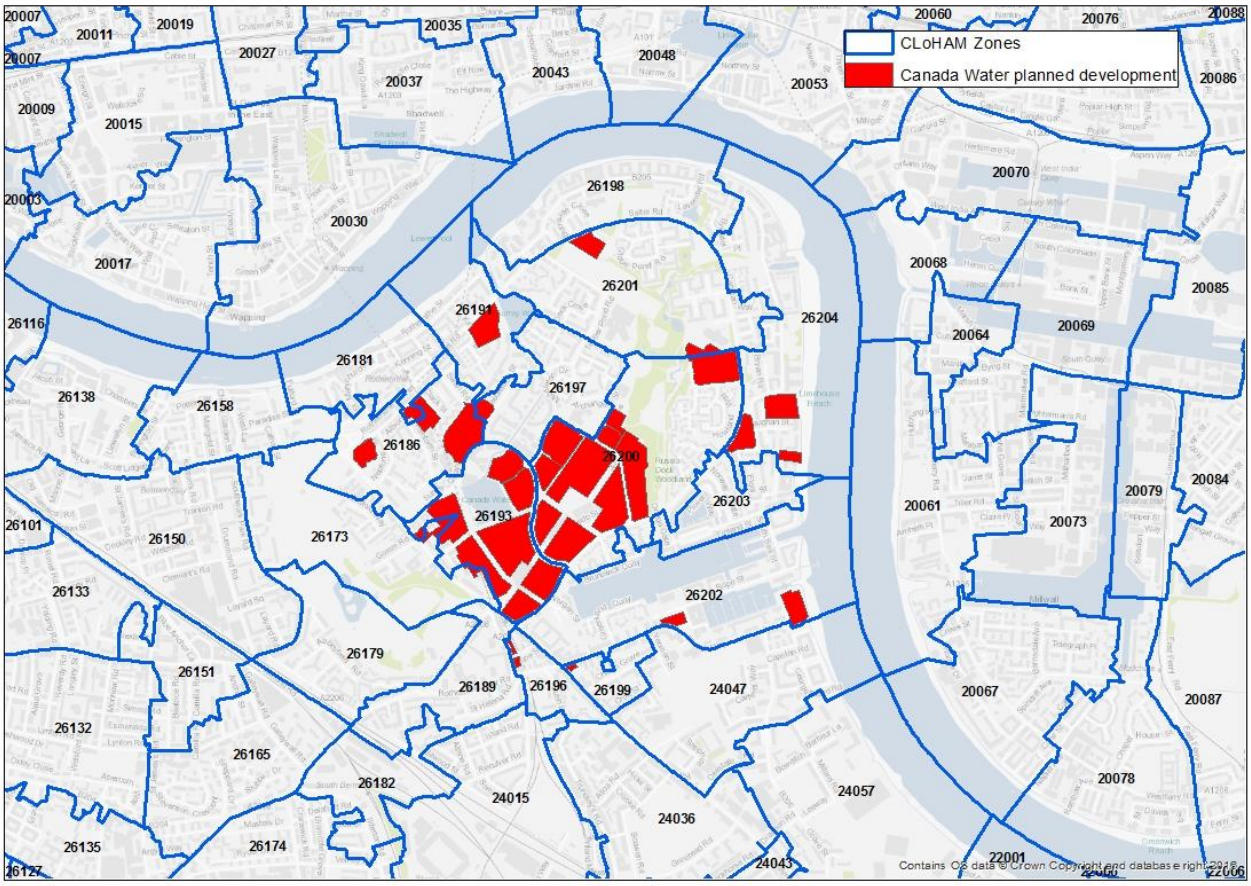
2.3 Zoning system

The current CLoHAM zoning system of 2668 zones currently includes a reasonably fine zoning system serving the area of Canada Water, as detailed in **Figure 4**. However, WebTAG Unit M3.1 section 2.3.11 states that: *"An important feature of the zoning system for the Area of Detailed Modelling in a highway assignment model is that the resultant numbers of trips to and from individual zones should be approximately the same for most zones and that the numbers of trips to and from each zone should be some relatively small number, such as 200 or 300 per hour, to avoid unrealistically high loads appearing at some points in the network"*. The increase in demand generated from the proposed development may result in the flow of traffic exceeding 200 or 300 pcu/hr to and from each of these zones which may result in the need for disaggregation of the zoning system in the local area to adhere to the guidance above.

The focus of this study is to examine how the trips generated by the new development impact the local and strategic transport networks. It is therefore important that the new development trips are loaded as accurately as possible on to the network. Furthermore, the existing CLoHAM zones should be adjusted so the pockets of development sit within single zones rather than being split across many as demonstrated with some sites shown below.

The disaggregation of zones will not be undertaken as part of the base year calibration and will be done when development trips are introduced to the network in the forecasting assignments.

Figure 4: CLoHAM zoning system



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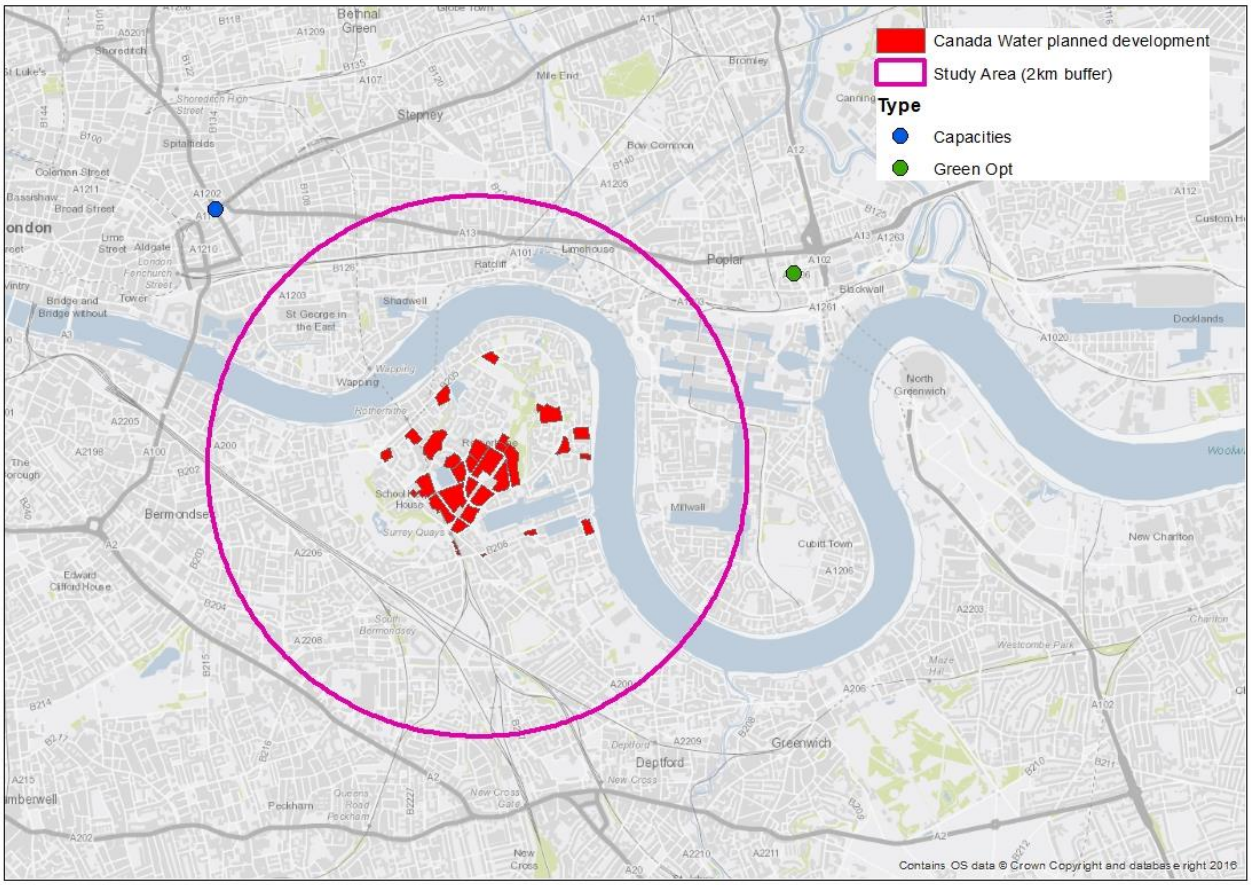
2.4 Convergence Issues

The 10 worst nodes and turns for 6 different convergence criteria (flows, green opt, capacities, gaps, delays and nodes) have been extracted from CLoHAM and plotted in **Figure 5**; only those within close proximity of the study area have been displayed.

As the only nodes exhibiting signs of poor convergence are outside of the study area and on the other side of the river, these are of no concern to the study and will not be examined further.

Figure 5: Worst converged



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2.5 Realism Checks

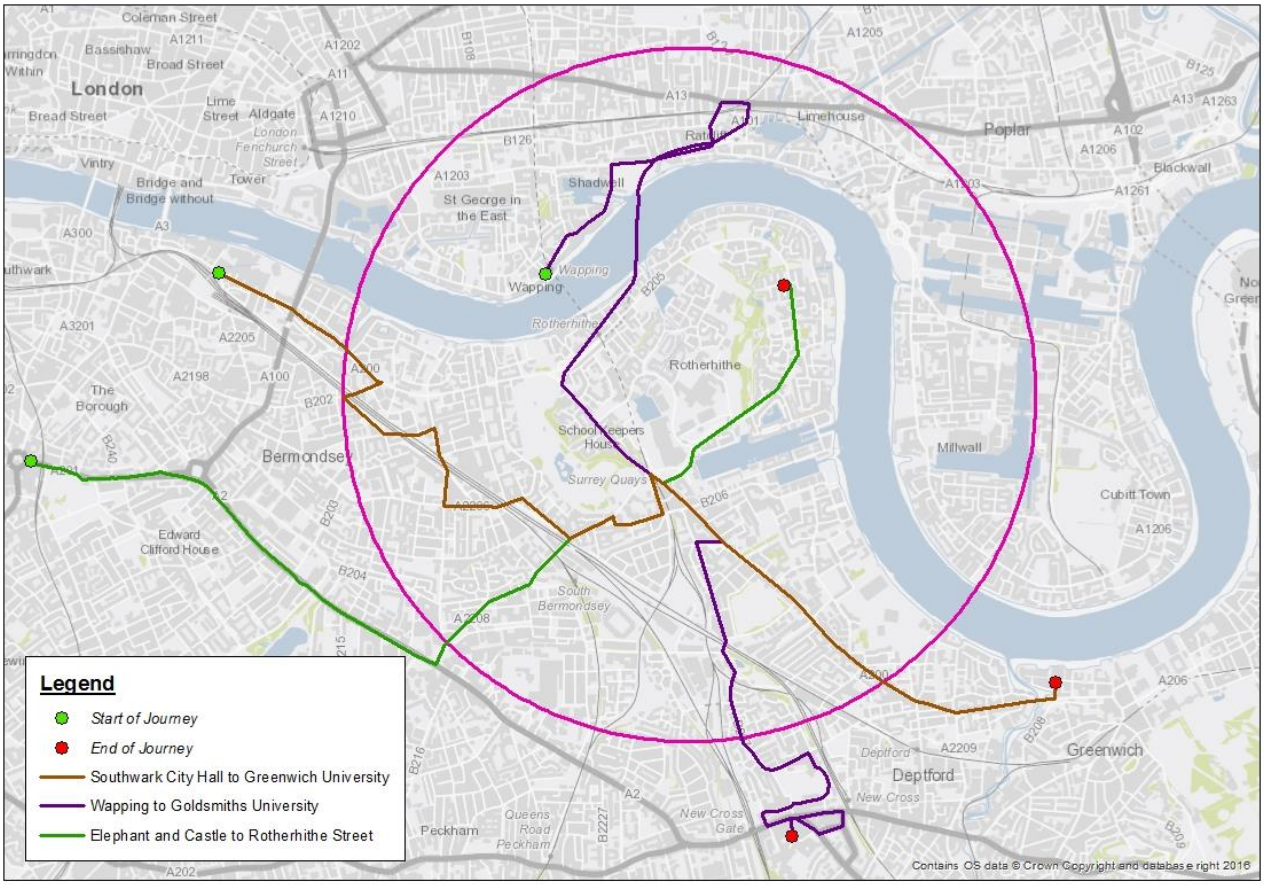
2.5.1 Routeing

Key traffic routes through the study area have been chosen to check they are logical and realistic in accordance with the TfL HAM guidance. The following O-D pairs were selected to check the minimum cost route:

- Southwark City Hall to Greenwich University (zone 26085 to 22006)
- Wapping to Goldsmiths University (zone 20030 to 24053)
- Elephant and Castle to Rotherhithe Street (zone 26024 to 26204)

Trees for each OD pair above are displayed in **Figure 6**.

Figure 6: Realism Testing Routes



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Each origin and destination pair follows a sensible route and matches well with Google Maps suggested routeing in the PM peak hour.

The logical route from Southwark City Hall to Greenwich University would be along Jamaica Road and Lower Road via the Rotherhithe Tunnel southern roundabout, however, it seems that the queueing and delay on Jamaica Road due to traffic accessing the Rotherhithe Tunnel is so

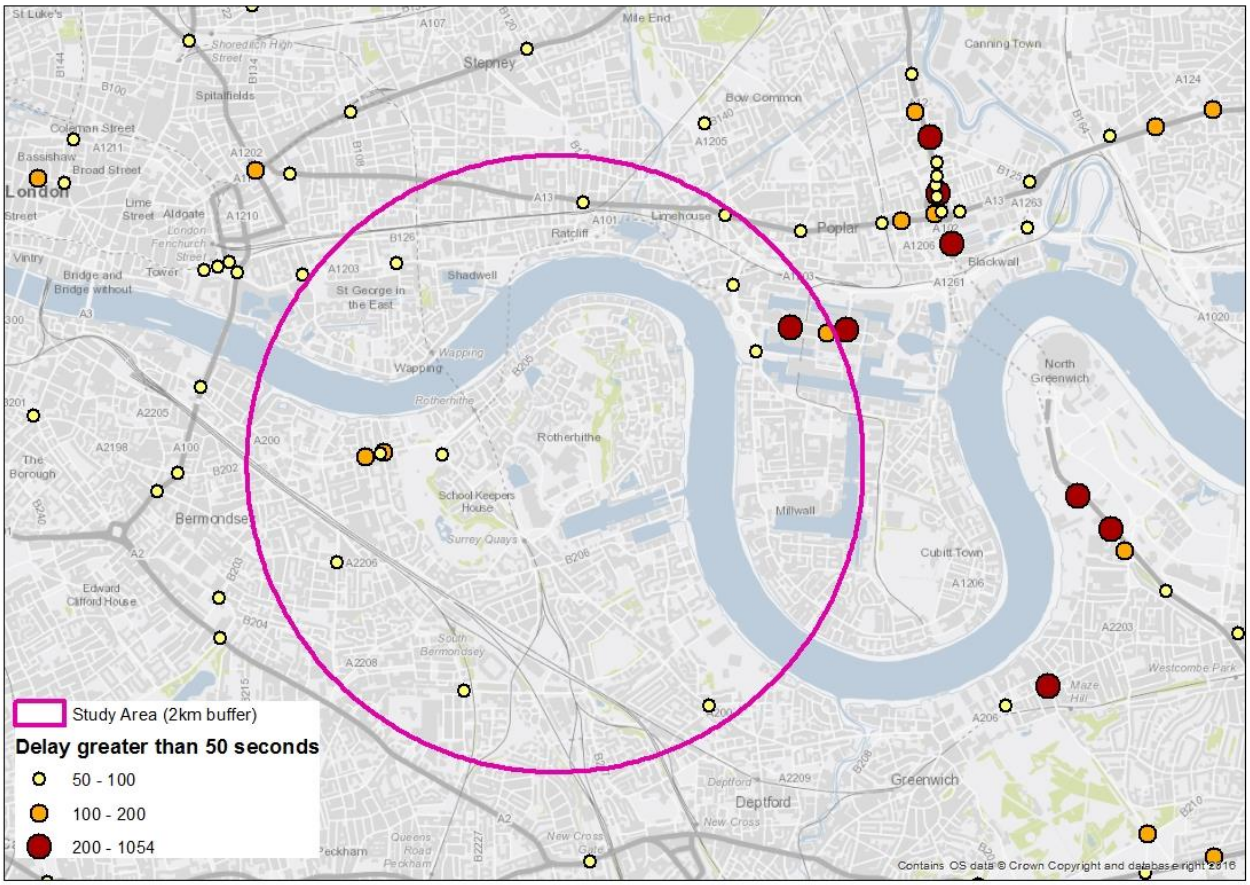
severe in the model that the minimum cost route is to re-route via Abbey St and connect with Lower Rd via Rotherhithe Old Rd.

2.5.2 Excessive delays and volumes exceeding capacity

Realism checks were undertaken comparing model output with known areas of excessive delay and locations where volumes of traffic exceed the capacity of the junction. **Figure 7** and **Figure 8** display the flow weighted average delay at a junction (node) and ratio of volume to capacity (V/C) respectively.

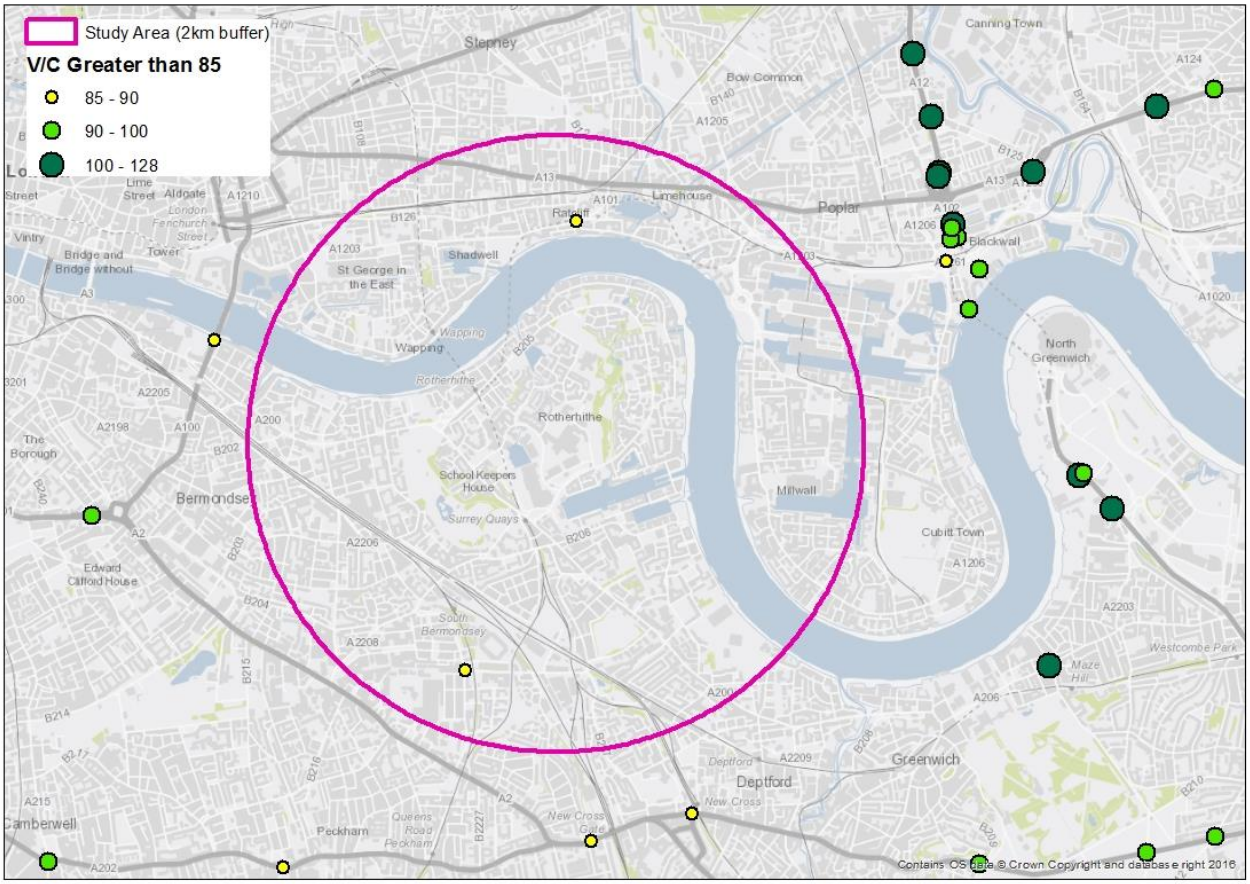
Both figures indicate that large amounts of delay and queueing is experienced at the northern end of the Blackwall Tunnel with minimal amounts in the Canada Water area except for the approach to the Rotherhithe Tunnel southern roundabout along Jamaica Rd and Lower Rd, as expected.

Figure 7: Average junction delay > 50 seconds



Source: Ordnance Survey data © Crown copyright and database right 2016

Figure 8: Volume/Capacity (%)



Source: Ordnance Survey data © Crown copyright and database right 2016

2.6 Screenline and Enclosure Performance

A selection of existing screenlines were selected around the Canada Water study area for analysis in accordance with TfL's HAM guidance. The screenlines chosen were as follows:

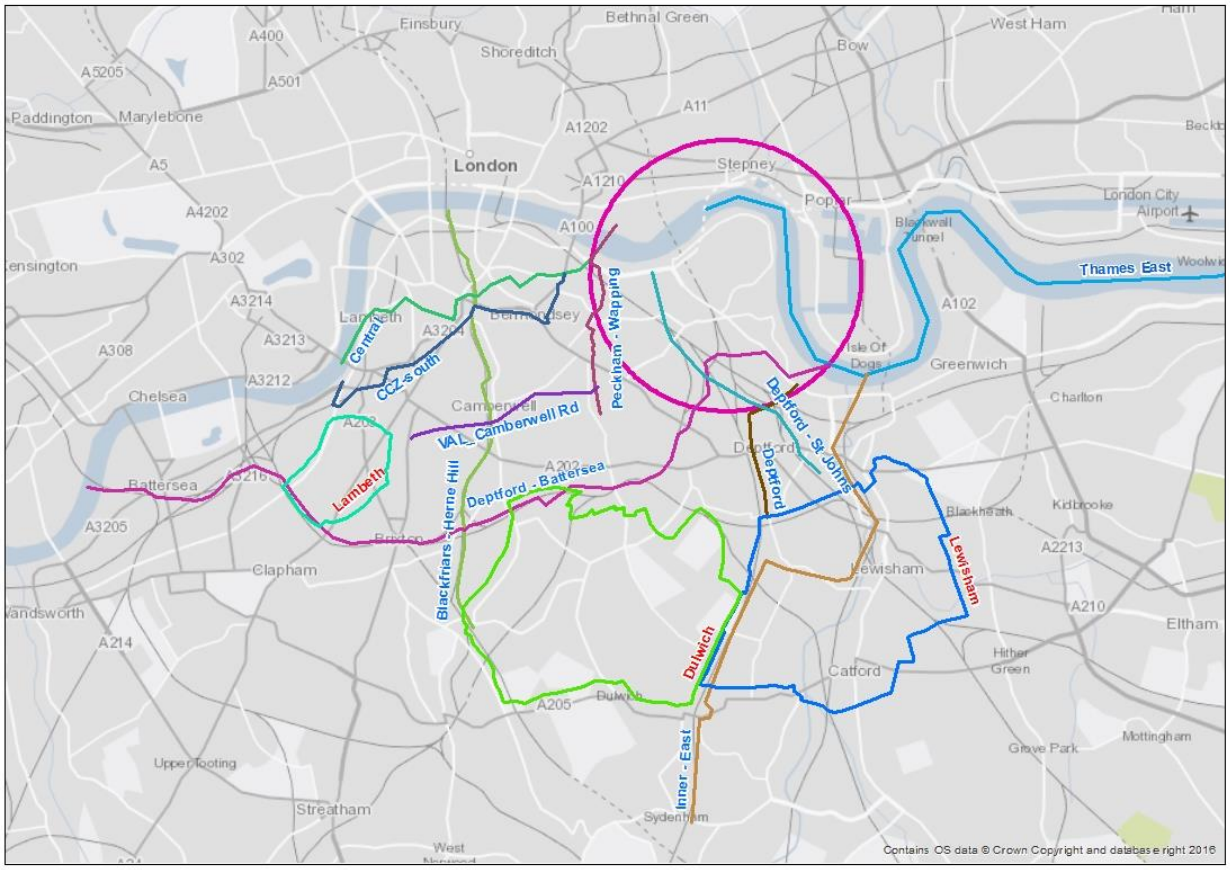
- Deptford
- VAL_Camberwell Rd
- Peckham - Wapping
- Deptford - Battersea
- Blackfriars - Herne Hill
- Inner - East
- Central
- Deptford - St Johns
- CCZ-south

The following enclosures were also selected for analysis:

- Dulwich
- Lambeth (East Cordon)

- Lewisham

Figure 9: Selected Screenlines and Enclosures



Source: Ordnance Survey data © Crown copyright and database right 2016

The screenline and enclosure validation results for the selection above are shown in **Table 1** and **Table 2**. All results displayed in this section are taken from the model as it was received from TfL to gain an understanding as to how well the model already performs in the study area before any updates were made or any re-calibration took place.

Table 1: Screenline Validation Results

Screenlines	Direction	Observed	Modelled	% Diff	GEH	Total No of sites	Sites with GEH<5	% sites with GEH<5
Deptford	Eastbound	2503	2618	4.6%	2.3	6	2	33%
Deptford	Westbound	2990	3119	4.3%	2.3	6	0	0%
VAL Camberwell Rd	Northbound	2953	2919	-1.1%	0.6	9	8	89%
VAL_Camberwell Rd	Southbound	3187	3252	2.0%	1.1	9	6	67%
Peckham - Wapping	1	5050	5134	1.7%	1.2	11	8	73%
Peckham - Wapping	2	3721	3752	0.8%	0.5	11	9	82%
Deptford - Battersea	1	10729	11002	2.5%	2.6	29	22	76%
Deptford - Battersea	2	12812	12448	-2.8%	3.2	27	19	70%
Blackfriars - Herne Hill	1	7011	6723	-4.1%	3.5	21	11	52%
Blackfriars - Herne Hill	2	6419	6379	-0.6%	0.5	19	14	74%
Inner - East	1	5196	5248	1.0%	0.7	11	9	82%
Inner - East	2	6939	6696	-3.5%	2.9	12	9	75%
Central	1	5097	5050	-0.9%	0.7	14	10	71%
Central	2	7570	7511	-0.8%	0.7	12	11	92%
Deptford - St Johns	1	3685	3547	-3.8%	2.3	8	5	63%
Deptford - St Johns	2	3002	2596	-13.5%	7.7	9	5	56%
CCZ-south	1	5382	5325	-1.1%	0.8	12	12	100%
CCZ-south	2	6245	6880	10.2%	7.8	13	8	62%

Table 2: Enclosure Validation Results

Screenlines	Direction	Observed	Modelled	% Diff	GEH	Total No of sites	Sites with GEH<5	% sites with GEH<5
Dulwich	Inbound	7474	7323	-2.0%	1.8	42	21	50%
Dulwich	Outbound	7713	7675	-0.5%	0.4	43	26	60%
Lambeth (East Cordon)	Inbound	3359	3394	1.0%	0.6	20	13	65%
Lambeth (East Cordon)	Outbound	3508	3498	-0.3%	0.2	19	6	32%
Lewisham	Inbound	9992	10133	1.4%	1.4	47	20	43%
Lewisham	Outbound	10504	10761	2.4%	2.5	49	24	49%

WebTAG unit M3.1 states that the validation criterion and acceptability guideline when using screenlines and enclosures is as follows: *"Differences between modelled flows and counts should be less than 5% of the counts."* 92% of the 24 selected screenlines and enclosures meet the criterion above, for those that do not, the following links have been identified for further analysis:

- Deptford – St Johns direction 2: the modelled flow on Sanford St (south of Trundleys Rd) is approximately 240 below the observed flow. An initial comparison between the modelled network, the zoning system GIS layer and Google Maps indicates that the loading location of zone 24041 to the north is not accurate and should be revised to load further south.
- CCZ-south direction 2: Flows on Old Kent Rd and Kennington Park Rd appear to be too high when compared to observed values, network coding along these corridors should be reviewed against existing conditions as capacity here may be over-estimated.

Table 3 displays the total number of screenlines and enclosures combined that meet the WebTAG criterion of a 5% or less difference in CLoHAM. 84% of screenlines and enclosures meet this criterion.

Table 3: All CLoHAM Screenlines and Enclosures

Screenlines + Enclosures	Total	%
Total number of screenlines and enclosures	184	
Screenlines/Enclosures with flow difference <5%	155	84%
Screenlines/Enclosures with total flow difference GEH<4	166	90%

Source: Dashboard_v3.69.4_CLoHAM_R003_AsReceivedFromTfL.xlsm

Table 4 summarises the results from **Table 1** and shows that 92% of the screenlines and enclosures in the vicinity of the Canada Water study area meet the WebTAG criterion of a 5% difference thus performing better than the wider strategic model.

Table 4: Canada Water Selected Screenlines and Enclosures

CW Screenlines + Enclosures	Total	%
Total number of screenlines and enclosures	24	
Total flow difference across all screenlines/enclosures		0%
Screenlines/Enclosures with flow difference <5%	22	92%
Screenlines/Enclosures with total flow difference GEH<4	22	92%

Source: Dashboard_v3.69.4_CLoHAM_R003_AsReceivedFromTfL.xlsm

Table 5 displays how the modelled link at each individual count site, which combine to form screenlines and enclosures, performs. 64% of all modelled links achieve the WebTAG criterion of a GEH value less than 5.

The GEH statistic is used to compare modelled and observed link flow data and is calculated as follows:

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

Where: M = modelled flow;

C = observed count.

Table 5: All CLoHAM Link Performance

Count - Full area	Total	%
No of counts	2,960	
Counts satisfying WebTAG Flow criteria	2,228	75%

Count - Full area	Total	%
Counts with GEH <5	1,897	64%
Counts with GEH <7.5	2,293	77%

Source: Dashboard_v3.69.4_CLoHAM_R003_AsReceivedFromTfL.xlsm

A similar summary of count sites in the Canada Water area is shown in **Table 6** and shows that 70% of the individual count sites achieve a GEH of less than 5, thus also performing better than the strategic model.

Table 6: Canada Water Area Link Performance

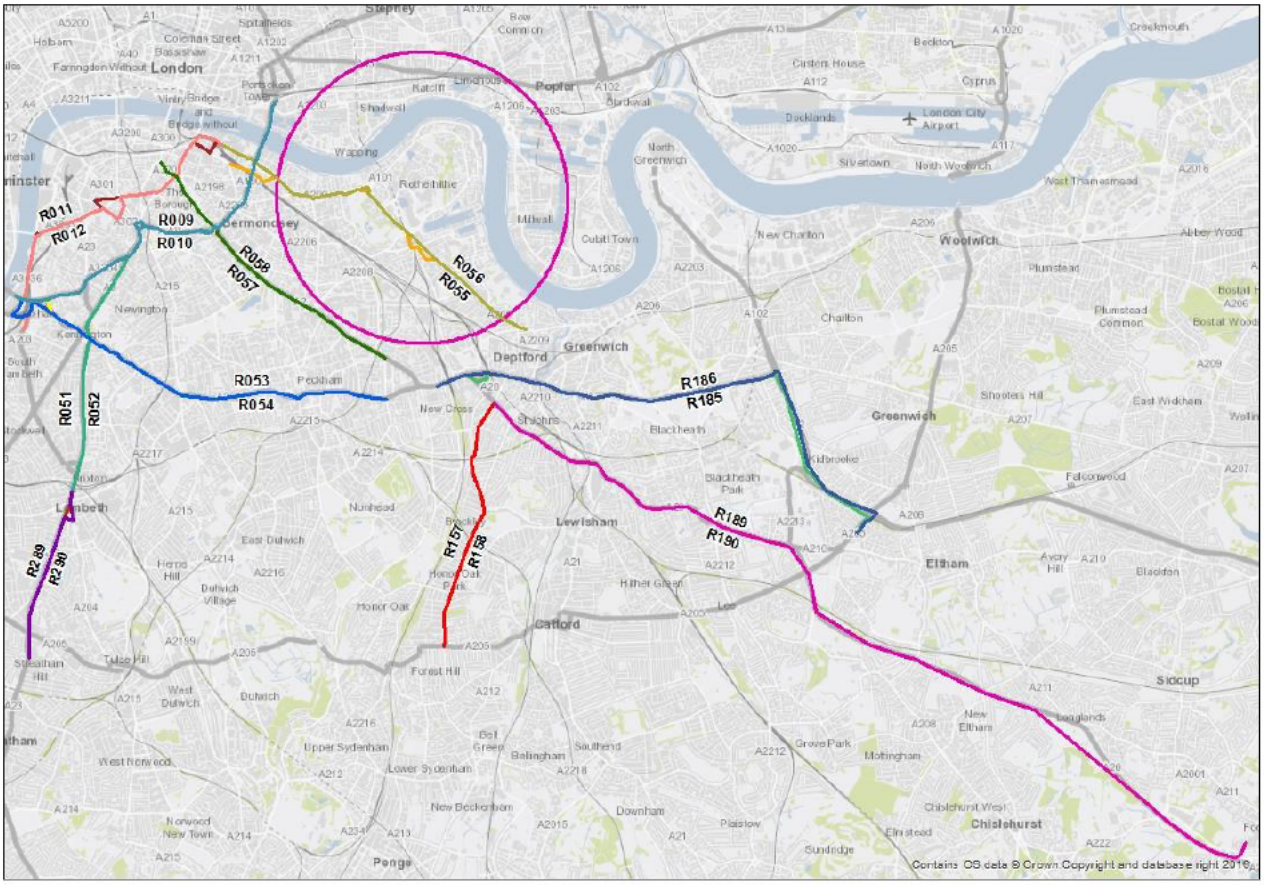
Count - CW area	Total	%
No of counts	249	
Counts satisfying WebTAG Flow criteria	205	82%
Counts with GEH <5	174	70%
Counts with GEH <7.5	207	83%

Source: Dashboard_v3.69.4_CLoHAM_R003_AsReceivedFromTfL.xlsm

2.7 Journey Time Validation

TfL's HAM guidance requires that observed journey times, from TrafficMaster, are compared against modelled journey times to confirm validation. 20 journey time routes have been selected i.e. 10 routes in each direction. These are shown in Figure 10.

Figure 10: Selected Journey Time Routes



Source: Ordnance Survey data © Crown copyright and database right 2016

The journey time validation results are shown in **Table 7**.

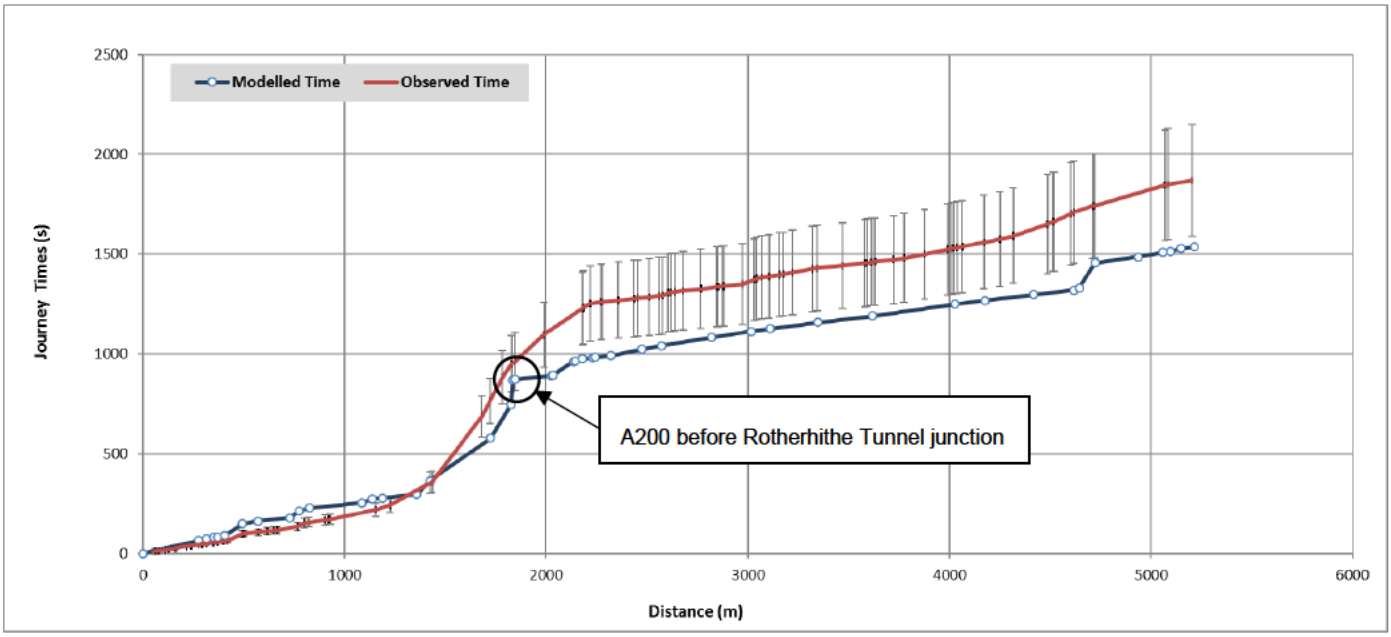
Table 7: Journey Time Validation Results

Route	Direction	Length (km)	Observed	Modelled	% Difference	Pass/Fail
R009	NB	5.6	1601	1508	-5.82%	✓
R010	SB	6.1	1372	1557	13.53%	✓
R011	EB	5.4	1057	1184	12.02%	✓
R012	WB	5.2	1182	1115	-5.74%	✓
R051	NB	3.5	732	774	5.71%	✓
R052	SB	3.4	874	803	-8.13%	✓
R053	EB	5.6	1802	1584	-12.09%	✓
R054	WB	6.1	1283	1339	4.37%	✓
R055	NB	5.1	914	1033	8.21%	✓
R056	SB	5.2	1867	1536	-17.77%	×
R057	NB	4.2	694	800	15.23%	×
R058	SB	4.2	921	926	0.58%	✓
R289	NB	5.9	1308	1186	-9.34%	✓
R290	SB	6.0	1491	1431	-4.02%	✓

Route	Direction	Length (km)	Observed	Modelled	% Difference	Pass/Fail
R185	NB	7.8	1054	1162	10.17%	✓
R186	SB	8.0	1592	1708	7.31%	✓
R189	EB	13.0	2379	2237	-5.97%	✓
R190	WB	12.7	1873	2053	9.62%	✓
R157	NB	3.7	620	628	1.34%	✓
R158	SB	3.7	727	681	-6.31%	✓

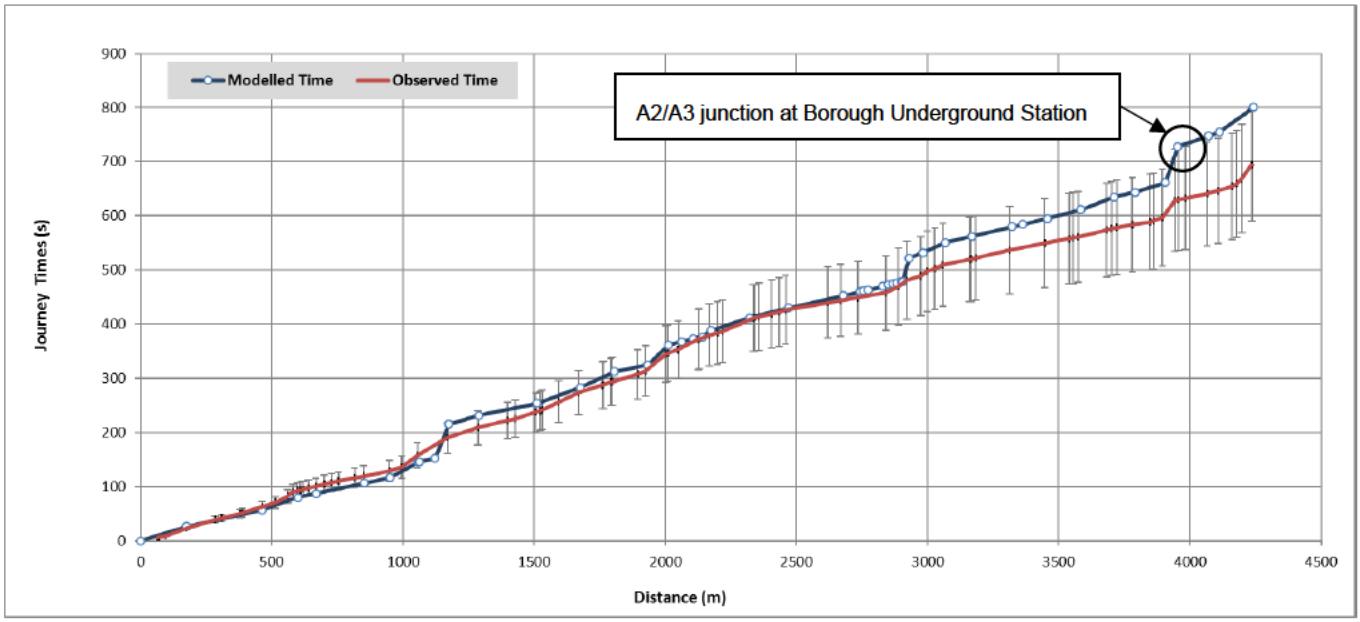
Route 056 fails to meet the WebTAG criterion of the modelled journey time required to be within 15% of observed journey time with a difference of almost 18%. Upon further inspection of the model, it is apparent that delay on the A200 leading to the Rotherhithe Tunnel roundabout is significantly less than what is observed, as indicated below in **Chart 1**. As indicated in **Section 2.2.1**, this is a significant junction with regards to the study and it is therefore important that delay experienced at this junction is accurately represented.

Chart 1: R056



Route 057 also fails with differences just exceeding 15%. Upon further inspection the model gives too much delay at the A2/A3 junction at Borough Underground Station. Here, the modelled time is slightly more than the observed time but this may be improved in the model through the adjustment of signal timings at this junction.

Chart 2: R057


Modelled Time
Observed Time
A2/A3 junction at Borough Underground Station
Journey Times (s)
Distance (m)
0
100
200
300
400
500
600
700
800
900
0
500
1000
1500
2000
2500
3000
3500
4000
4500

3 Updated Base model

The CLoHAM base year model described above in **Section 2** was re-calibrated to improve validation results for the selected screenlines, enclosures and journey time routes displayed in **Section 2.6** and **Section 2.7** and the validation of individual links which form the screenlines and enclosures.

3.1 Modifications to the Network

The following changes were made to the CLoHAM P3 network as received from TfL:

3.1.1 Changes to zone loading

- A zone representing the residential area next to Sanford Street (zone 24041) appeared to be loading traffic to and from a spigot link which represented Rolt Street (node 24405), this was inaccurate and the connection was removed.
- A spigot link was connected on to Surrey Canal Road (link 24152 to new node 24999) to allow access into zone number 24015 to represent Mercury Way.
- Upon further inspection of the network, it was decided that the following zones' connections onto the network required revision to reflect the points more accurately at which demand could be loaded or unloaded:
  - Zone 26122 – connection to link 26177-26178 removed, connection to link 26194-26195 added
  - Zone 26137 – connection to link 26199-26179 added
  - Zone 24069 – connection to link 24673-24136 removed
  - Zone 24037 – connection to link 24454-24109 added
  - Zone 26133 – connection to link 26442-26277 removed
  - Zone 26132 – connection to links 26567-26566 and 26577-26570 removed, connection to link 26276-26273 added

3.1.2 Changes to signal timings

- The signal timings for the A2/A3 junction at Borough Underground station, as indicated in **Chart 2** (node 27038) were changed to 25/0, 9/5, 15/7, 14/5 to reflect reduced capacity along this route and slower moving traffic.
- The pedestrian time on node 24465, a signalised crossing on Evelyn Street, was increased by 8 seconds to allow a more realistic time of pedestrians crossing here.
- Speed flow curves were changed on Vesta Road to 812 for consistency with adjacent links.
- The signal timings at the New Cross Rd/Queen's Rd junction (node 24114) were changed to 32/7, 27/-24. This now incorporates a pedestrian crossing stage.
- The signal timings for the following signalised nodes were changed to give a more realistic capacity based on the counts that were available:
  - Lewisham Way/Friendly St (node 24136) - cycle time 90s; 48/7, 28/7
  - Evelyn St pedestrian crossing (node 24679) - 60/-28
  - Jamaica Rd/West Lane (node 26456) - 34/6, 11/22, 15/0
  - South Lambeth Rd (node 28488) - 40/5, 48/3

  - Newington Butts/Kennington Park Rd (node 27336) - 30/6, 32/0, 23/5
  - Old Kent Rd/East St (node 26154) - 56/5, 22/5
- Signal timings at the Camberwell Church St/Camberwell Green junction (node 26045) were changed to 26/0, 15/7, 20/6, 13/0, 11/6.

3.1.3 Changes to saturation flows

- The saturation flow representing the turn off the Rotherhithe Tunnel roundabout on to the A101 Rotherhithe Tunnel (turn 26644-26554-20187) was reduced to 1,000 to represent the reduction in capacity here because of the 2m width restriction on the exit of the roundabout.
- The saturation flows for the turns coming from Newington Butts to signalised junction Kennington Park Road/Kennington Lane were reduced due to the Cycle Super highway on Newington Butts reducing the capacity at the junction. The saturation flow from node 27424 to node 27336 was reduced to 1500 for ahead and 1800 for the right turn.
- The saturation flow from the eastern approach to the Shooters Hill Rd/Prince Charles Rd roundabout (node 22614) was increased to 2212 to reflect the 2 lane approach.

3.1.4 Other additional network adjustments

- Speed flow curve 913 was added to node 26459 from 27017. This was to represent a link based capacity restriction on Jamaica Road that resulted in queueing downstream for Rotherhithe tunnel.
- The flare length on Lower Road approaching the Rotherhithe tunnel roundabout northbound for the tunnel exit was approximately 85m. Therefore, the stacking capacity at node 26629 was increased to 15 from node 26645.
- Sternhall Lane became pedestrianised in 2012, therefore the signalised junction at Copeland Road/ Peckham Rye/ Sternhall Lane was adjusted. The link 26101-26099 was banned.
- A proportion of traffic heading southbound from the Rotherhithe Tunnel towards Old Kent Road appeared to be using Bolina Road which runs next to the Millwall Football Ground (link 26377-26496). Upon further inspection of the link through Google Street View, it appears that the road becomes a narrow single lane through a tunnel and is likely to be used only by local traffic. A 150s penalty was therefore applied to the link to deter traffic from using this route.

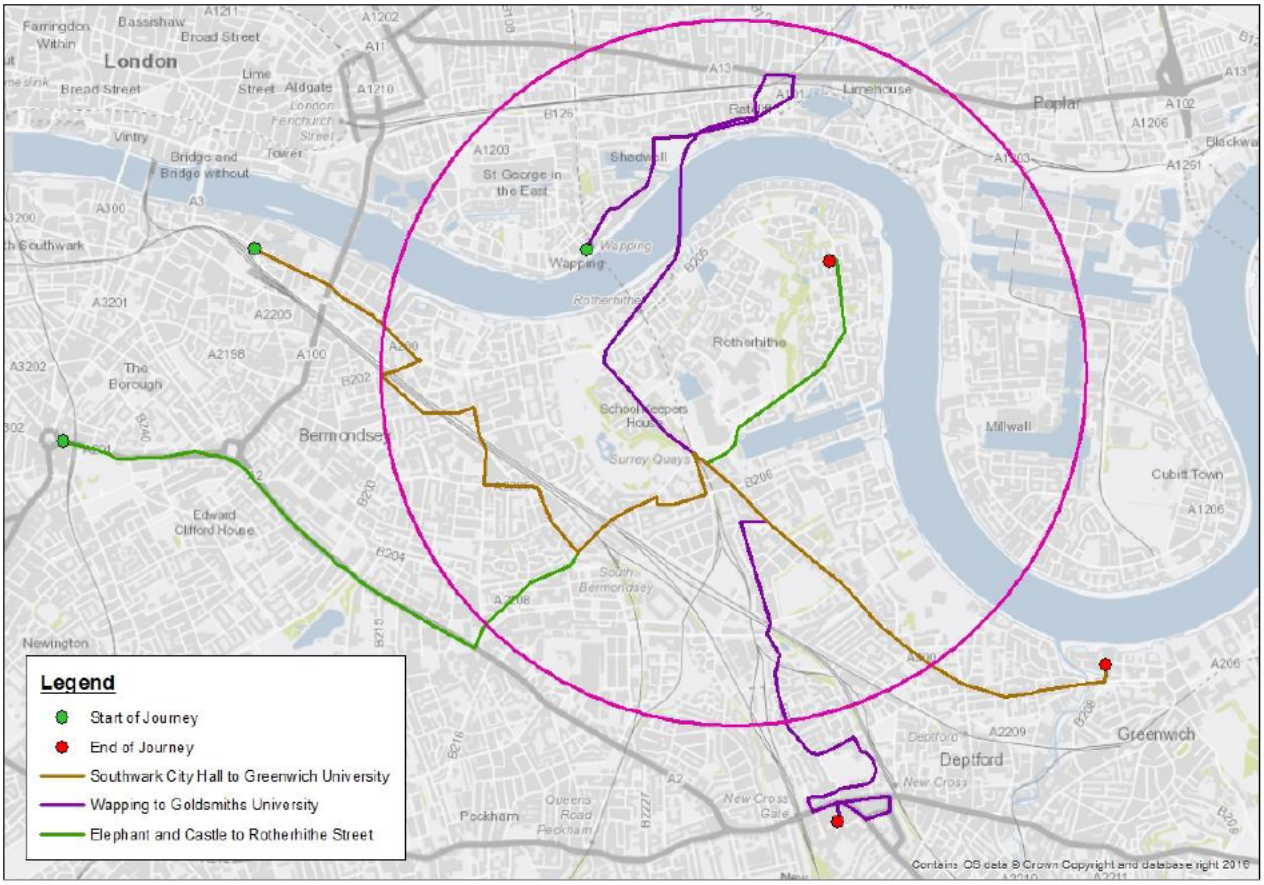
3.2 Modifications to the ME2 process

Tests were undertaken with re-arranged ‘SATP2’ count files which moved all counts of interest, i.e. counts which form the selected screenlines and enclosures, to the bottom of the file to give them additional impact on the ME2 process. However, all changes made were abandoned as they didn’t improve model validation.

3.3 Realism tests

The same 3 routes chosen to test how realistic routeing in the model is (**Figure 6**), were also tested in the Canada Water re-calibrated base model (**Figure 11**). The two figures show minimal differences between the routes pre and post calibration of the base year model with all origin-destination pairs showing sensible routeing.

Figure 11: Realism testing post calibration



Source: Ordnance Survey data © Crown copyright and database right 2016

3.4 Screenline and Enclosure performance

The screenline and enclosure validation results for the Canada Water base model can be seen in **Table 8** and **Table 9** respectively.

Table 8: Canada Water base model screenlines

Screenlines	Direction	Observed	Modelled	% Diff	GEH	Total No of sites	Sites with GEH<5	% sites with GEH<5
Deptford	Eastbound	2503	2570	2.7%	1.3	6	3	50%
Deptford	Westbound	2990	3137	4.9%	2.7	6	1	17%
VAL_Camberwell Rd	Northbound	2953	2934	-0.6%	0.3	9	8	89%
VAL_Camberwell Rd	Southbound	3187	3248	1.9%	1.1	9	6	67%
Peckham - Wapping	1	5050	5177	2.5%	1.8	11	8	73%
Peckham - Wapping	2	3721	3717	-0.1%	0.1	11	10	91%
Deptford - Battersea	1	10729	10916	1.7%	1.8	29	25	86%
Deptford - Battersea	2	12812	12447	-2.8%	3.2	27	18	67%
Blackfriars - Herne Hill	1	7011	6762	-3.5%	3.0	21	13	62%

Screenlines	Direction	Observed	Modelled	% Diff	GEH	Total No of sites	Sites with GEH<5	% sites with GEH<5
Blackfriars - Herne Hill	2	6419	6305	-1.8%	1.4	19	15	79%
Inner - East	1	5196	5191	-0.1%	0.1	11	9	82%
Inner - East	2	6939	6716	-3.2%	2.7	12	9	75%
Central	1	5097	5041	-1.1%	0.8	14	10	71%
Central	2	7570	7540	-0.4%	0.4	12	11	92%
Deptford - St Johns	1	4140	3983	-3.8%	2.5	8	4	50%
Deptford - St Johns	2	2547	2498	-1.9%	1.0	9	8	89%
CCZ-south	1	5382	5311	-1.3%	1.0	12	12	100%
CCZ-south	2	6245	6802	8.9%	6.9	13	9	69%

Source: Dashboard_v3.69.4_CLoHAM_R003_MEv6d.xlsm

Table 9: Canada Water base model enclosures

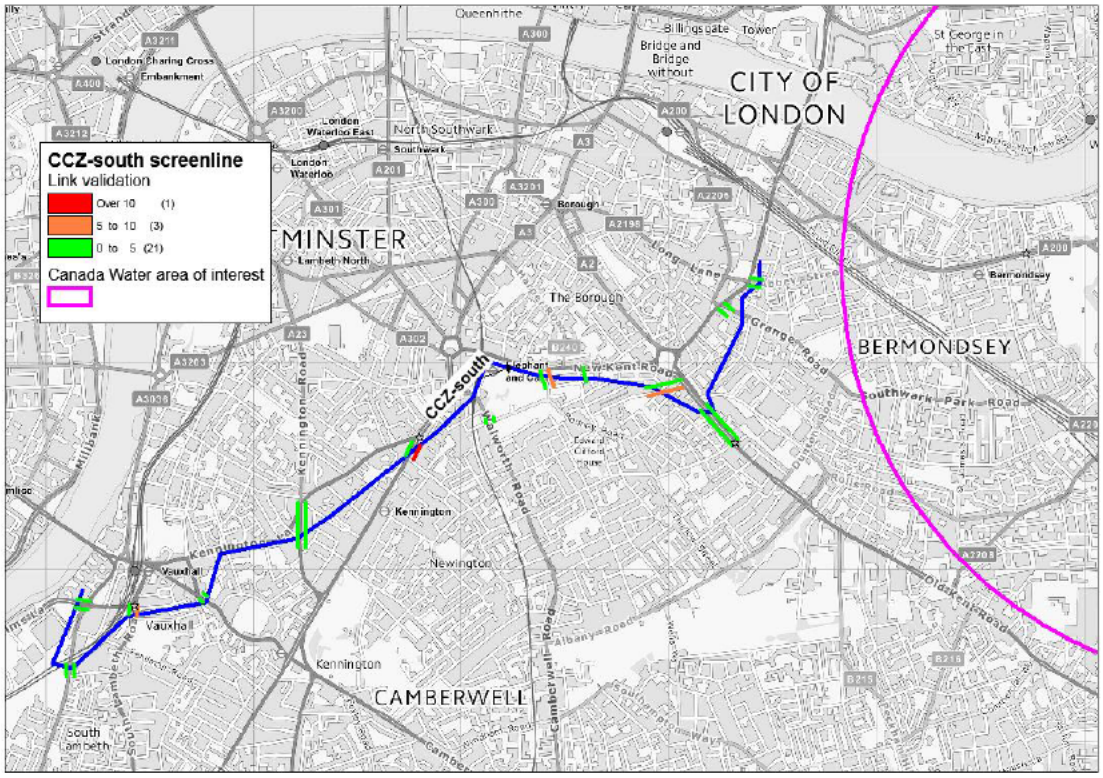
Enclosures	Direction	Observed	Modelled	% Diff	GEH	Total No of sites	Sites with GEH<5	% sites with GEH<5
Dulwich	Inbound	7474	7311	-2.2%	1.9	42	20	48%
Dulwich	Outbound	7713	7773	0.8%	0.7	43	27	63%
Lambeth (East Cordon)	Inbound	3359	3428	2.0%	1.2	20	13	65%
Lambeth (East Cordon)	Outbound	3508	3525	0.5%	0.3	19	6	32%
Lewisham	Inbound	9992	10006	0.1%	0.1	47	18	38%
Lewisham	Outbound	10504	10659	1.5%	1.5	49	23	47%

Source: Dashboard_v3.69.4_CLoHAM_R003_MEv6d.xlsm

All screenline and enclosure flows are within WebTAG acceptability criteria for most cases; however, there is one exception where this does not occur:

- Screenline CCZ-south gives a total modelled flow which is 8.9% higher than the total observed flows, this exceeds the WebTAG criteria of a 5% difference. However, as seen in **Figure 12**, the 4 links which exceed a GEH value of 5 are well outside of the Canada Water area of interest with the most poorly validated link heading southbound on Kennington Park Road which is well beyond the study area.

Figure 12: CCZ-south individual link validation



Source: Ordnance Survey data © Crown copyright and database right 2016

Overall, this shows an improvement in screenline validation in the study area in comparison with the received CLoHAM model; this comparison can be seen in more detail in **Table 16**.

The total screenlines and enclosures achieving WebTAG criteria at the strategic model level and a local Canada Water level are shown in **Table 10** and **Table 11** respectively.

Table 10: Canada Water base model – All screenlines + enclosures

Screenlines + Enclosures	Total	%
Total number of enclosures	184	
Total flow difference across all enclosures		0%
Enclosures with flow difference <5%	154	84%
Enclosures with total flow difference GEH<4	166	90%

Source: Dashboard_v3.69.4_CLoHAM_R003_MEv6d.xlsm

Table 11: Canada Water base model – Selected screenlines + enclosures

CW Screenlines + Enclosures	Total	%
Total number of screenlines	24	
Total flow difference across all screenlines		0%
Screenlines with flow difference <5%	23	96%
Screenlines with total flow difference GEH<4	23	96%

Source: Dashboard_v3.69.4_CLoHAM_R003_MEv6d.xlsm

Table 12 and **Table 13** show the individual link validation for the re-calibrated Canada Water base model at the strategic model level and a local Canada Water level respectively.

Table 12: Canada Water base model link validation – All links

Count - Full area	Total	%
No of counts	2,960	
Counts satisfying WebTAG Flow criteria	2,223	75%
Counts with GEH <5	1,898	64%
Counts with GEH <7.5	2,299	78%

Source: Dashboard_v3.69.4_CLoHAM_R003_MEv6d.xlsm

Table 13: Canada Water base model link validation – CW links

Count - CW area	Total	%
No of counts	249	
Counts satisfying WebTAG Flow criteria	208	84%
Counts with GEH <5	185	74%
Counts with GEH <7.5	217	87%

Source: Dashboard_v3.69.4_CLoHAM_R003_MEv6d.xlsm

Comparisons between the CLoHAM P3 base model and the re-calibrated Canada Water base model link validation are shown in **Table 17**.

3.5 Journey Time Validation

The journey time validation results for the Canada Water base model are shown in **Table 14**.

Table 14: Canada Water base model journey time validation

Route	Direction	Length (km)	Observed	Modelled	% Difference	Pass/Fail
R009	NB	5.6	1601	1484	-7.33%	✓
R010	SB	6.1	1372	1572	14.63%	✓
R011	EB	5.4	1057	1189	12.51%	✓
R012	WB	5.2	1182	1120	-5.28%	✓
R051	NB	3.5	732	774	5.67%	✓
R052	SB	3.4	874	801	-8.30%	✓
R053	EB	5.6	1802	1637	-9.16%	✓
R054	WB	6.1	1283	1341	4.49%	✓
R055	NB	5.1	914	932	1.96%	✓
R056	SB	5.2	1867	1664	-10.90%	✓
R057	NB	4.2	694	787	13.39%	✓
R058	SB	4.2	921	907	-1.48%	✓
R289	NB	5.9	1308	1190	-9.04%	✓
R290	SB	6.0	1491	1431	-4.00%	✓
R185	NB	7.8	1054	1196	13.46%	✓
R186	SB	8.0	1592	1485	-6.73%	✓
R189	EB	13.0	2379	2212	-7.04%	✓
R190	WB	12.7	1873	2060	10.02%	✓
R157	NB	3.7	620	608	-1.90%	✓
R158	SB	3.7	727	674	-7.29%	✓

Source: Dashboard_v3.69.4_CLoHAM_R003_MEv6d.xlsm

All selected routes in the Canada Water area now meet the validation criteria in WebTAG of a modelled – observed difference less than 15%. This also reveals an improvement in comparison with the received CLoHAM model; this comparison is shown in more detail in **Table 18.**

3.6 Trip Matrix Estimation Outcomes

The differences between matrix totals prior to and post matrix estimation by user class are shown in **Table 15** and show a very minor increase in trips made overall by all vehicles.

Table 15: Prior and Post Matrix Estimation matrix totals

	UC 1	UC 2	UC 3	UC 4	UC 5	Total
	Car out of work time	Car in work time	Taxis	LGV	HGV	All vehicles
Prior	344,598	4,674,479	39,476	130,400	75,223	5,264,175
Post	354,452	4,740,869	38,588	124,500	72,526	5,330,935
% Diff.	3%	1%	-2%	-5%	-4%	1%

Source: Matrix total difference_CW6d.xlsx

Tables showing the regression statistics for zonal changes at a cell level disaggregated by time period and user class are shown in **Appendix A**. This analysis has been done for all cells including those where the value is zero, where the area outside of CLoHAM is considered as a single zone and where trips that have both an origin and destination outside of CLoHAM have been removed. The tables show that changes brought about by matrix estimation to user classes 1 and 2 are not significant.

Appendix B contains scatter diagrams of matrix cell values at a 34-sector level (by borough) and summary tables of sector to sector level matrix differences. Most sector-sector movements change by either less than 5% or with an absolute change less than 20.

Appendix C contains scatter diagrams of the trip destinations at zonal level. The scatter diagrams are annotated with the regression statistics and show that when assessed against the criteria set out in Table 5 of Section 8.13 of TAG Unit M3.1, the changes brought about by matrix estimation are considered not to be significant.

Appendix D contains the comparison of trip length distributions between the prior and post matrix estimated matrices, including tables showing means and standard deviations for prior and post matrix estimated matrices. Both the means and standard deviations are in total within 5% and are therefore not significant.

Appendix E contains scatter diagrams of the trip destinations at sector level. The changes at sector level are less significant than the changes at cell level.

4 Summary

It appears that the modifications to the model in the Canada Water area have improved the validation of the selected screenlines, enclosures, individual links and journey time routes within both the Canada Water area and the entire CLoHAM area.

Table 16 shows how the improvements mentioned in **Section 3.1** have affected the validation of both screenlines and enclosures combined in the full CLoHAM area and the localised Canada Water area. Green indicates an improvement in validation when compared to the model received from TfL and orange means no change.

Table 16: CLoHAM – CW base model screenline and enclosure comparison

Area	Criteria	CLoHAM base	CW base
CLoHAM area – 184 screenlines and enclosures	Difference < 5%	84%	84%
	GEH < 4	90%	90%
Canada Water Area – 24 screenlines and enclosures	Difference < 5%	88%	96%
	GEH < 4	92%	96%

Table 17 shows how the modifications to the network have improved the individual link validation in both the CLoHAM area and also the localised Canada Water area. Full results of all links in the Canada Water area for the CLoHAM model can be seen in **Appendix F** and results for the CW model can be seen in **Appendix G**. This includes plots showing GEH achieved for all links in the Canada Water area.

Table 17: CLoHAM – CW base model individual link comparison

	% links with GEH < 5	
Area	CLoHAM base	CW base
CLoHAM Area – 2960 links	64%	64%
Canada Water Area – 249 links	70%	74%

Table 18 shows how the modifications to the CW base model for the Canada Water area have affected the selected journey time routes through the area. The modifications to the network have had a positive impact on most journey time differences between the modelled and observed data. All routes now achieve a difference between modelled and observed journey times of less than 15% and can be seen in more detail in **Appendix H** and **Appendix I**.

Table 18: CLoHAM – CW base model journey time comparison

Route	Direction	Length (km)	CLoHAM base		CW base	
			% difference	Pass/Fail	% difference	Pass/Fail
R009	NB	5.6	-5.82%	✓	-7.33%	✓
R010	SB	6.1	13.53%	✓	14.63%	✓
R011	EB	5.4	12.02%	✓	12.51%	✓
R012	WB	5.2	-5.74%	✓	-5.28%	✓
R051	NB	3.5	5.71%	✓	5.67%	✓
R052	SB	3.4	-8.13%	✓	-8.30%	✓
R053	EB	5.6	-12.09%	✓	-9.16%	✓
R054	WB	6.1	4.37%	✓	4.49%	✓
R055	NB	5.1	8.21%	✓	1.96%	✓

Route	Direction	Length (km)	CLoHAM base		CW base	
R056	SB	5.2	-17.77%	×	-10.90%	✓
R057	NB	4.2	15.23%	×	13.39%	✓
R058	SB	4.2	0.58%	✓	-1.48%	✓
R289	NB	5.9	-9.34%	✓	-9.04%	✓
R290	SB	6.0	-4.02%	✓	-4.00%	✓
R185	NB	7.8	10.17%	✓	13.46%	✓
R186	SB	8.0	7.31%	✓	-6.73%	✓
R189	EB	13.0	-5.97%	✓	-7.04%	✓
R190	WB	12.7	9.62%	✓	10.02%	✓
R157	NB	3.7	1.34%	✓	-1.90%	✓
R158	SB	3.7	-6.31%	✓	-7.29%	✓

Given the improvements to the model within both the Canada Water area and the entire CLoHAM area, the modified highway model is deemed to be sufficiently detailed for the assessment of proposed development and any mitigation measures within the Canada Water area.

Appendices

A. Matrix Estimation changes at a zonal level

User class definitions for following tables:

UC1 – Cars in work time

UC2 – Cars out of work time

UC3 – Taxi

UC4 – LGV

UC5 – HGV

Table 4: Test Criteria

Criteria	Min	Max
Slope	0.98	1.02
Intercept	≈ 0	≈ 0
R2	0.95	1.00

Source: Table 5 TAG Unit M3.1
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/427124/webtag-tag-unit-m3-1-highway-assignment-modelling.pdf

Table 5: Regression statistics for Matrix Estimation

PM	slope	intercept	R2
UC1	1.00	0.002	1.00
UC2	1.00	0.013	1.00
UC3	0.95	0.000	0.71
UC4	0.98	-0.001	0.98
UC5	0.99	0.000	0.99
Total	1.00	0.002	1.00

Source: ME2_CW6d_cap zonal cell comparisons from SATURN.xlsx

B. Matrix Estimation changes to destination trips (sector level)

User class definitions for following figures:

UC1 – Cars in work time

UC2 – Cars out of work time

UC3 – Taxi

UC4 – LGV

UC5 – HGV

Figure 13: UC1

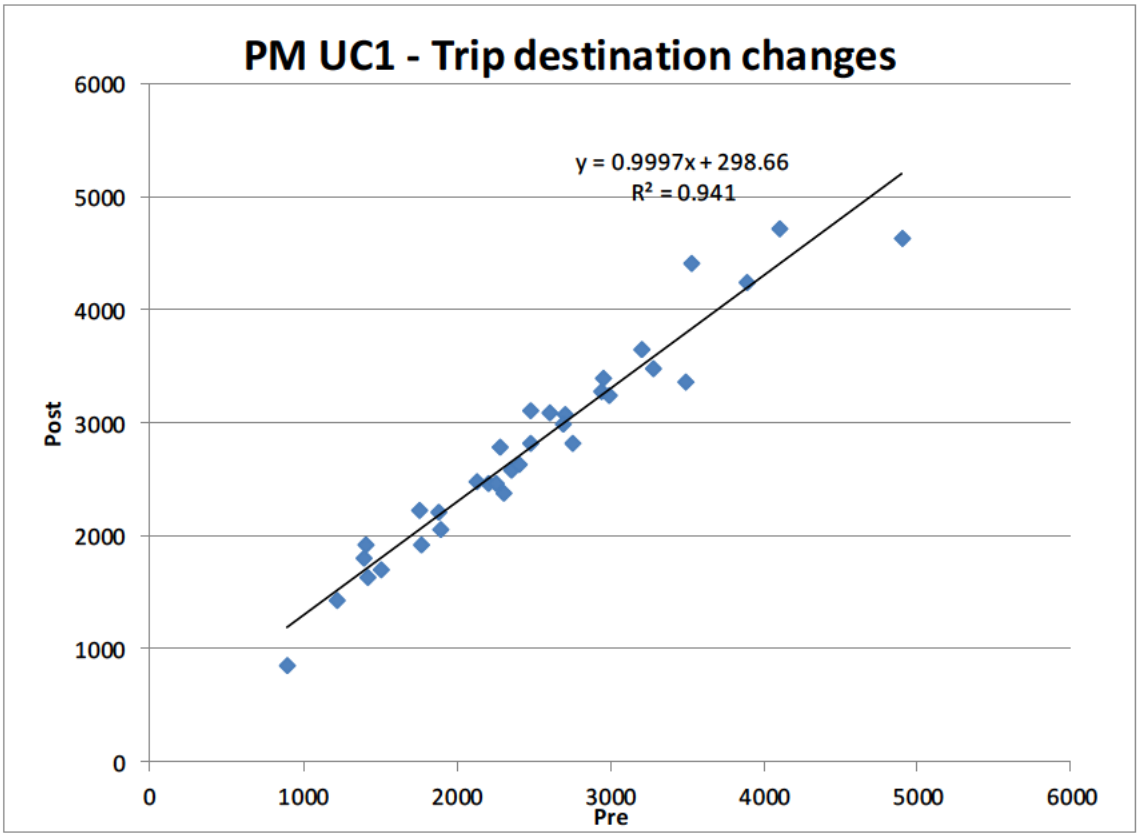


Figure 14: UC2

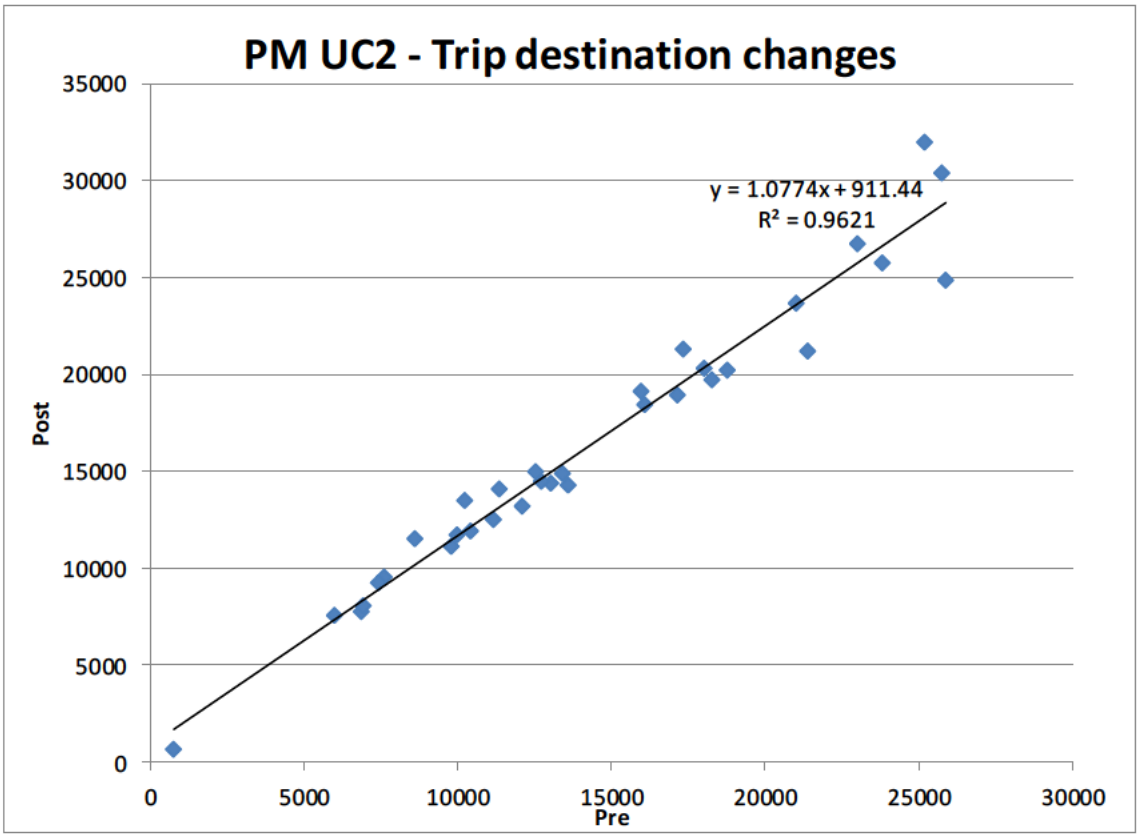


Figure 15: UC3

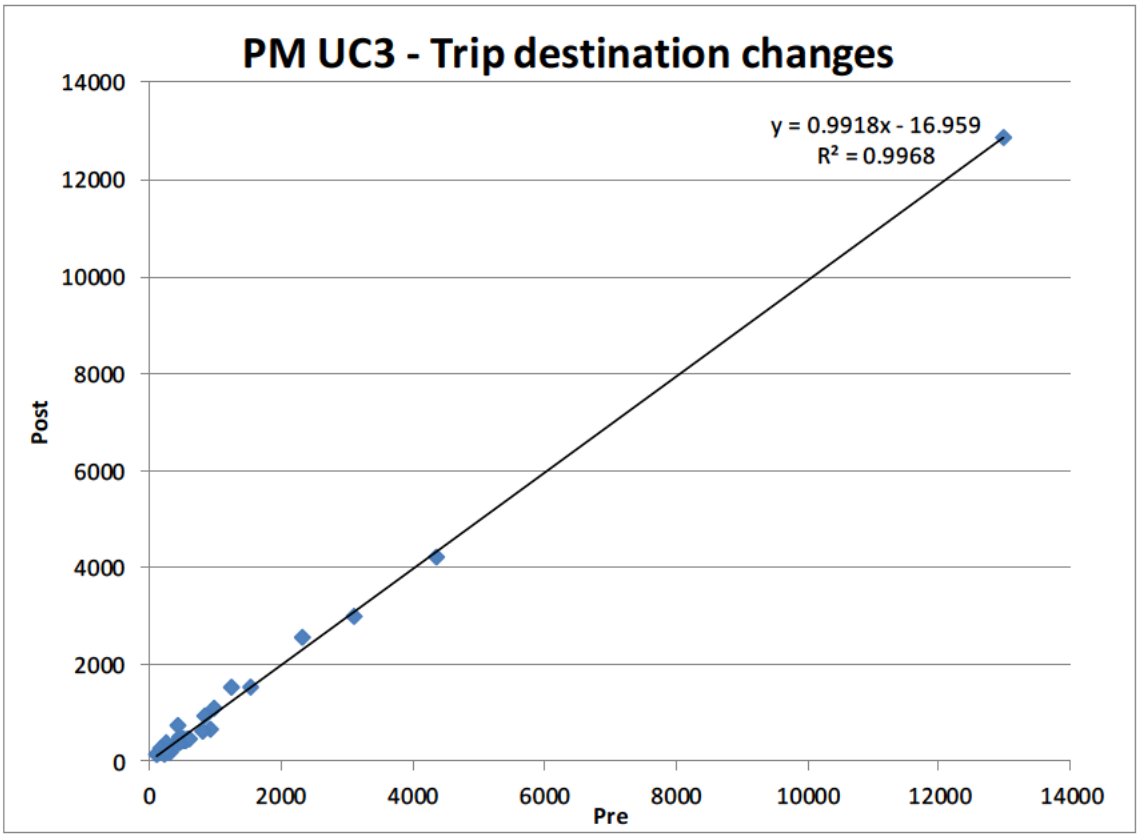


Figure 16: UC4

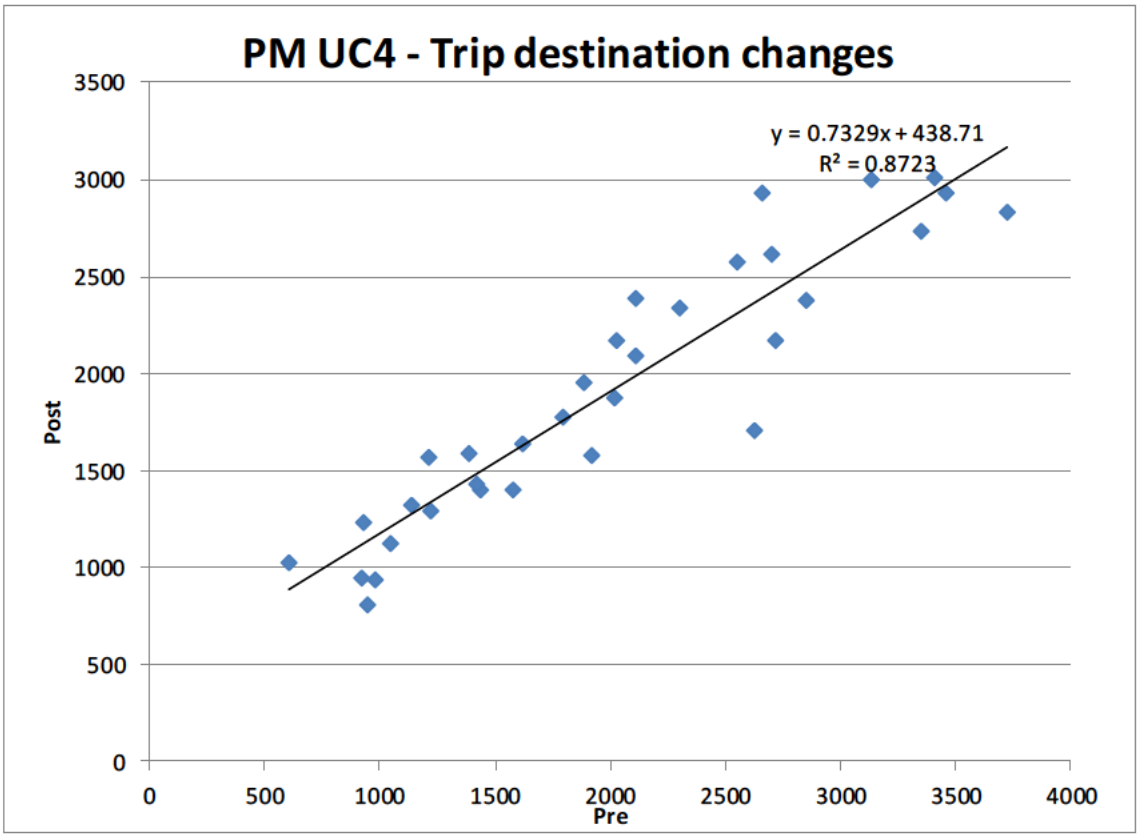
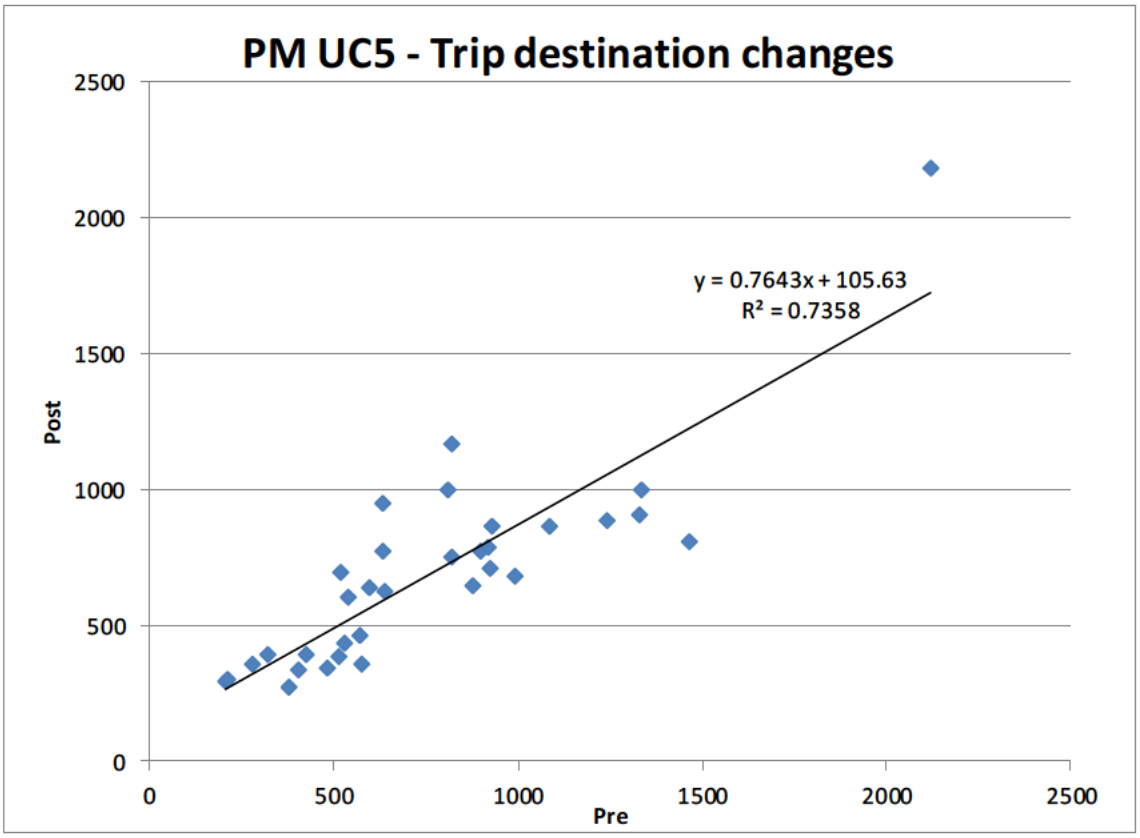


Figure 17: UC5



C. Matrix Estimation changes to destination trips (zonal level)

User class definitions for following figures:

UC1 – Cars in work time

UC2 – Cars out of work time

UC3 – Taxi

UC4 – LGV

UC5 – HGV

Figure 18: UC1

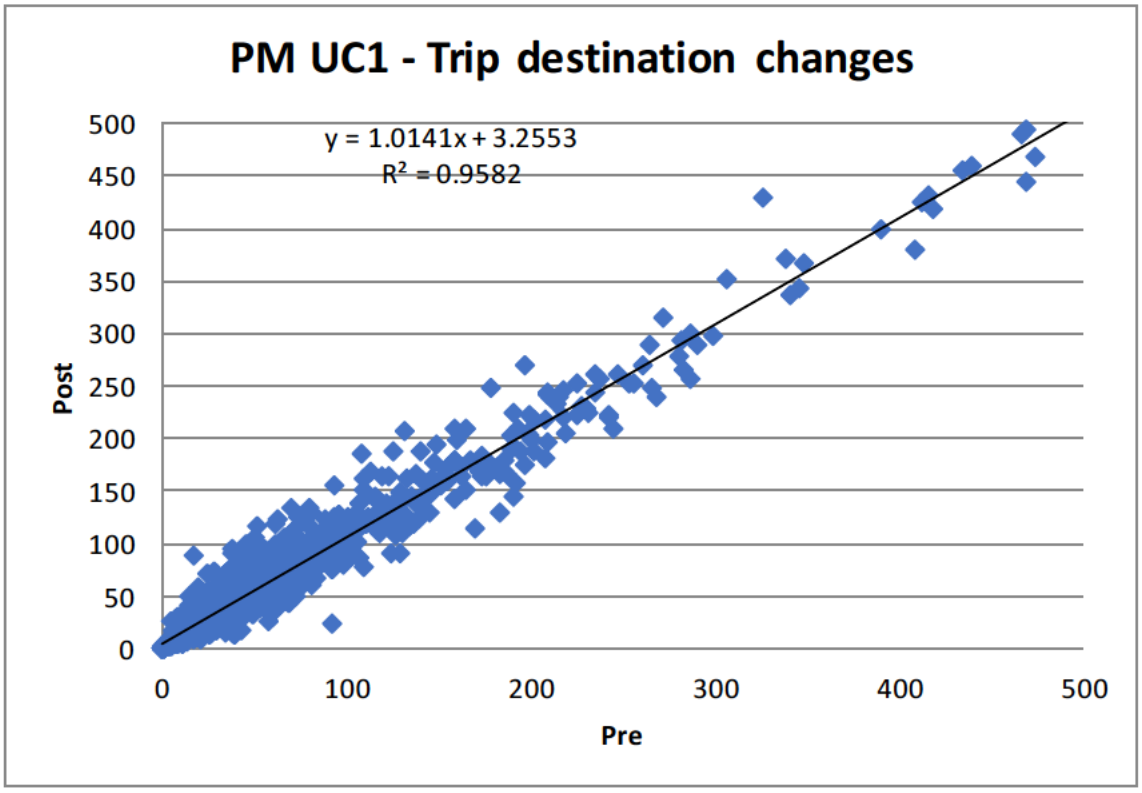


Figure 19: UC2

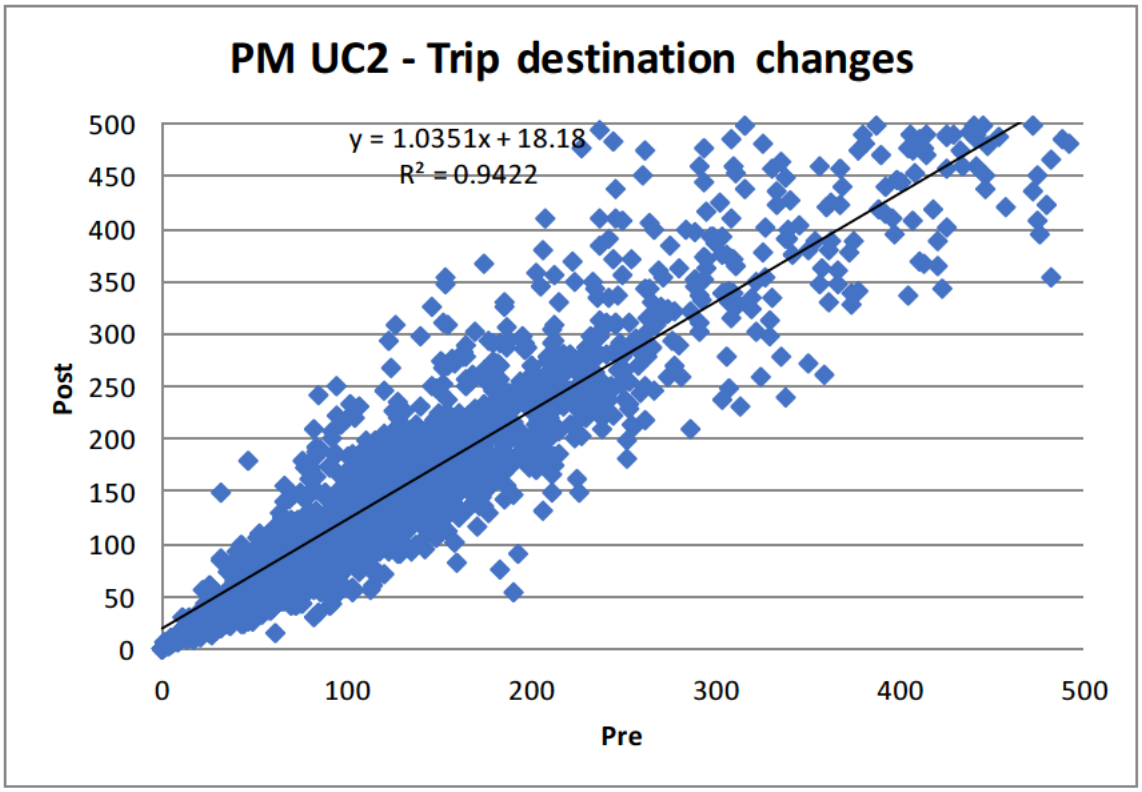


Figure 20: UC3

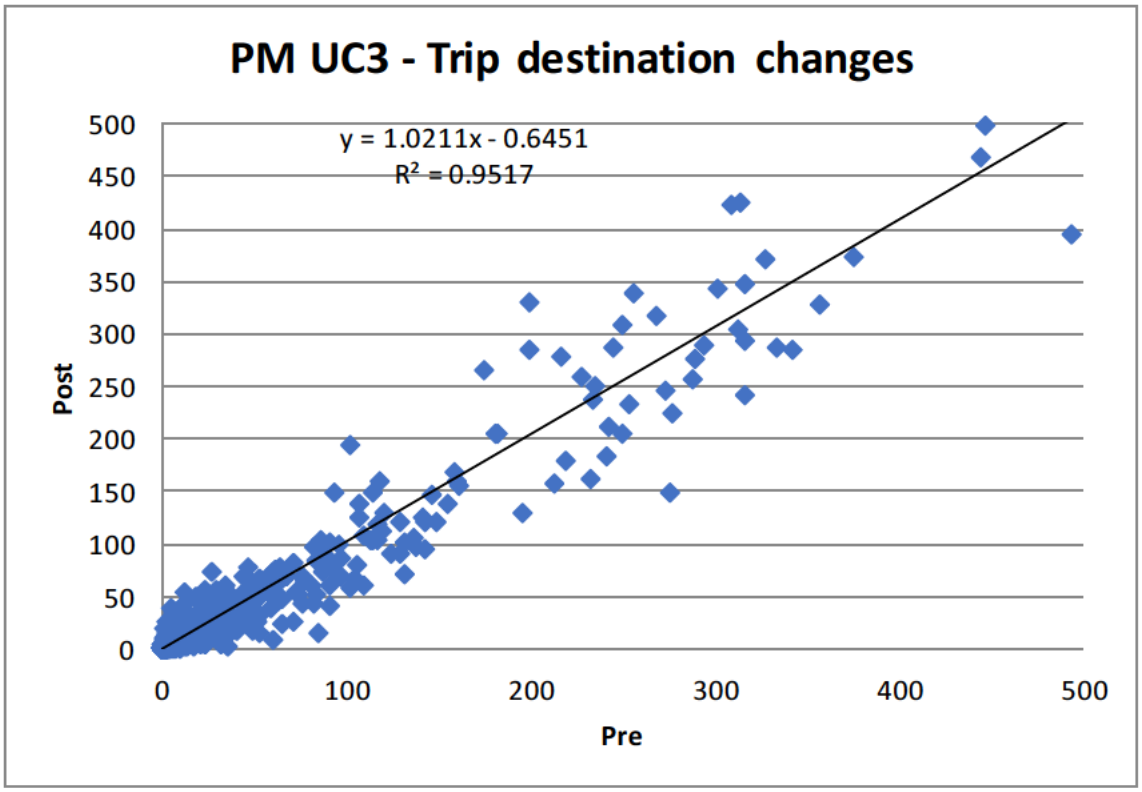


Figure 21: UC4

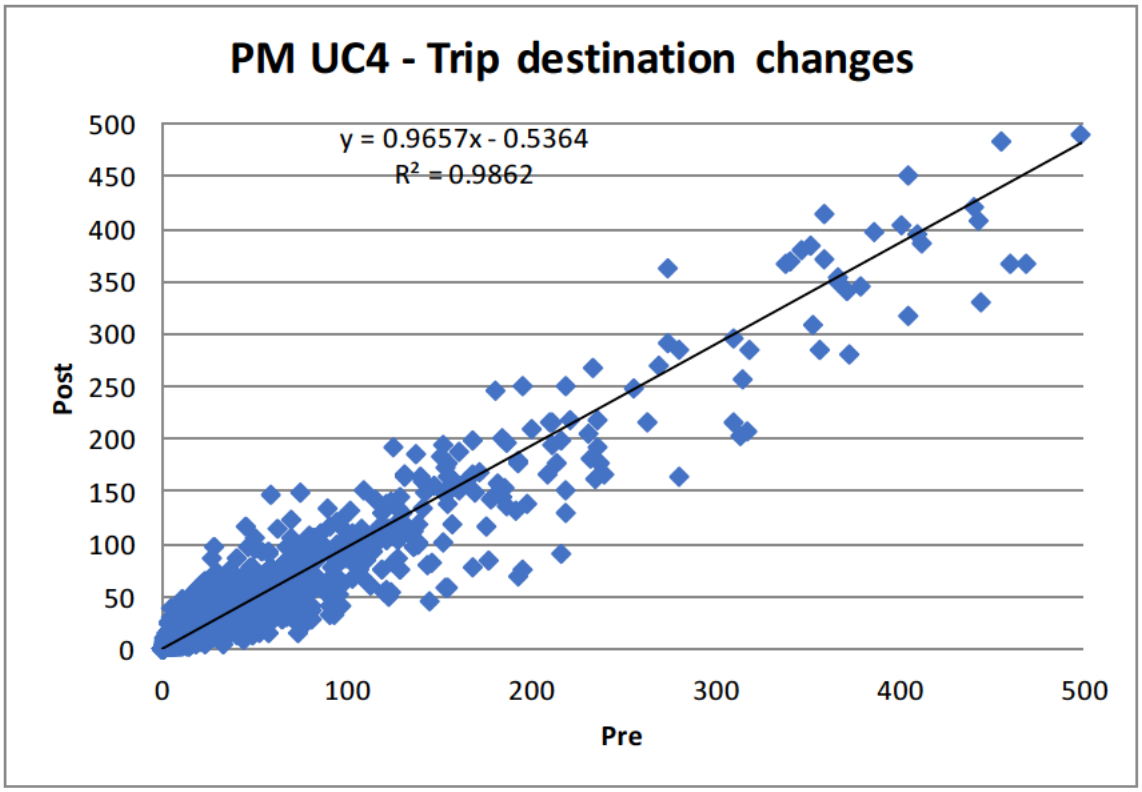
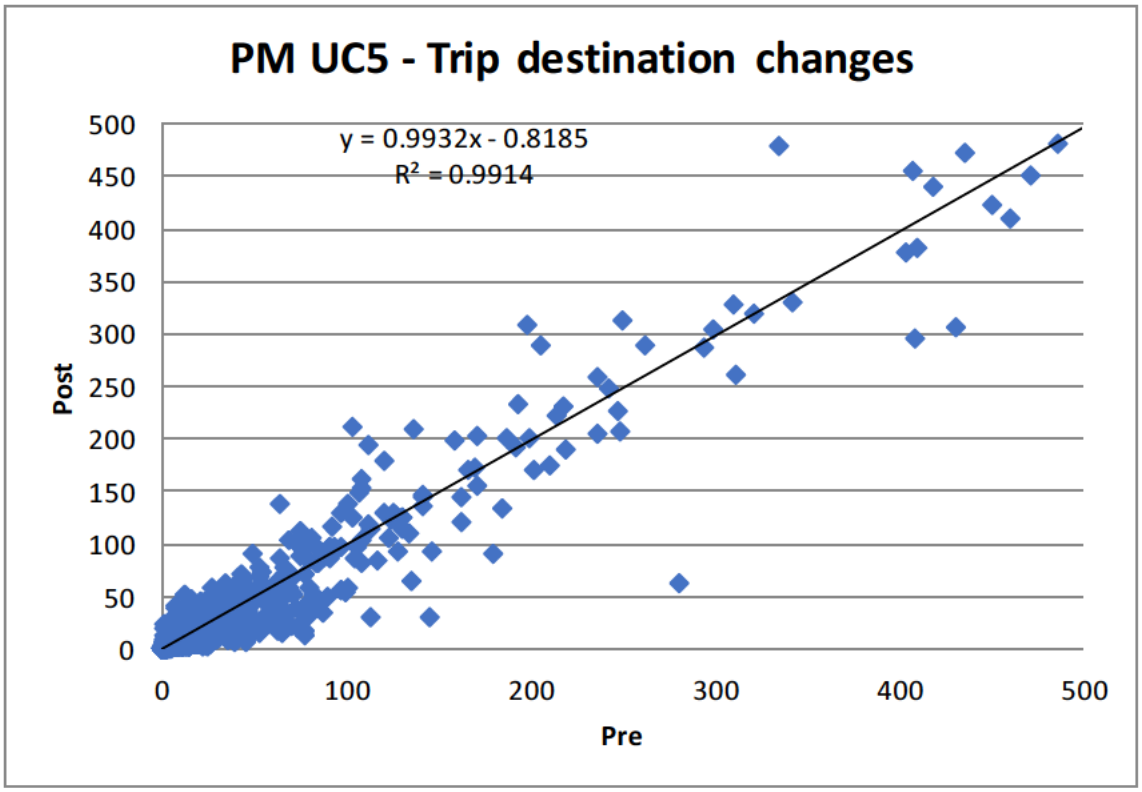


Figure 22: UC5



D. Matrix Estimation changes to Trip Length Distribution

Figure 23: TLD comparison

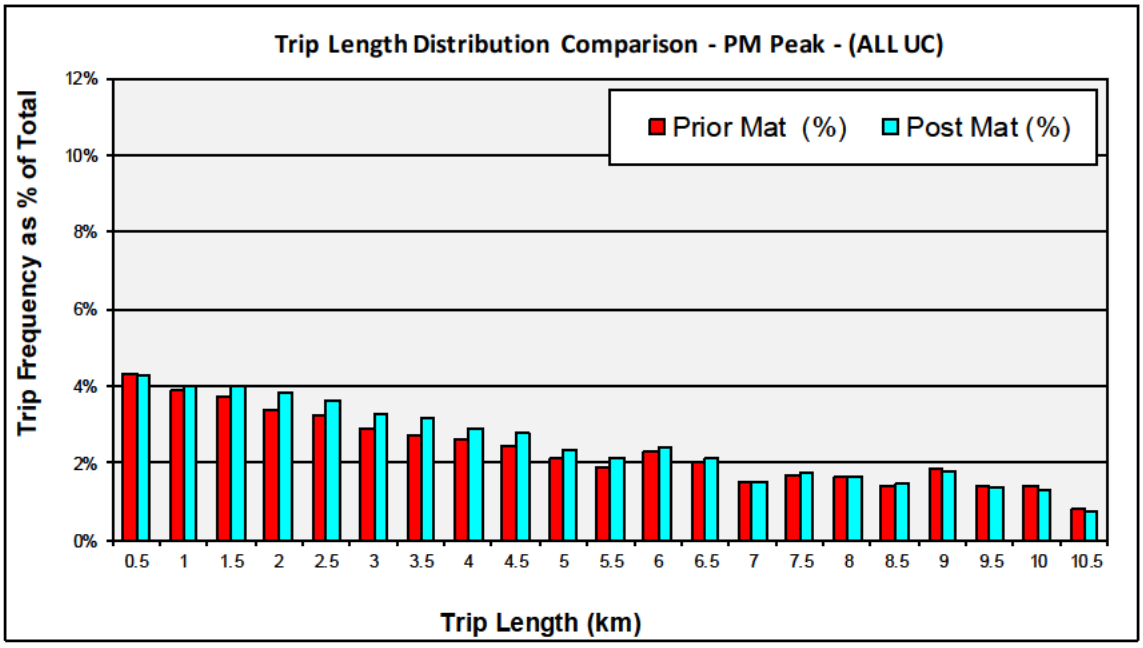


Table 6: TLD comparison

Prior matrix	UC1	UC2	UC3	UC4	UC5	Total
Mean	9.24	9.35	4.66	11.04	12.28	9.47
Standard deviation	3.04	3.06	2.16	3.32	3.50	3.08
Post-ME	**UC1**	**UC2**	**UC3**	**UC4**	**UC5**	**Total**
Mean	8.66	8.92	4.24	10.63	12.21	9.03
Standard deviation	2.94	2.99	2.06	3.26	3.49	3.00
% difference		**UC1**	**UC2**	**UC3**	**UC4**	**UC5**
Mean	-6.3%	-4.6%	-9.0%	-3.6%	-0.5%	-4.6%
Standard deviation	-3.2%	-2.3%	-4.6%	-1.8%	-0.3%	-2.4%

E. Matrix Estimation changes at a sector level

User class definitions for following figures:

UC1 – Cars in work time

UC2 – Cars out of work time

UC3 – Taxi

UC4 – LGV

UC5 – HGV

Figure 24: UC1

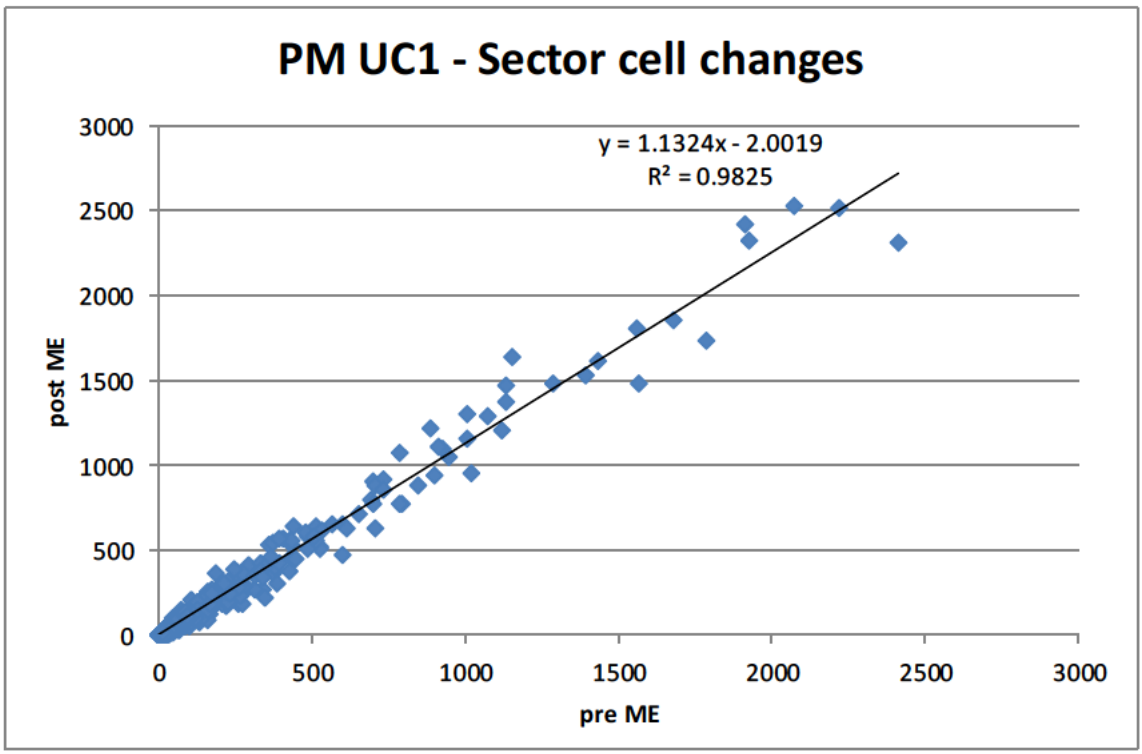


Figure 25: UC2

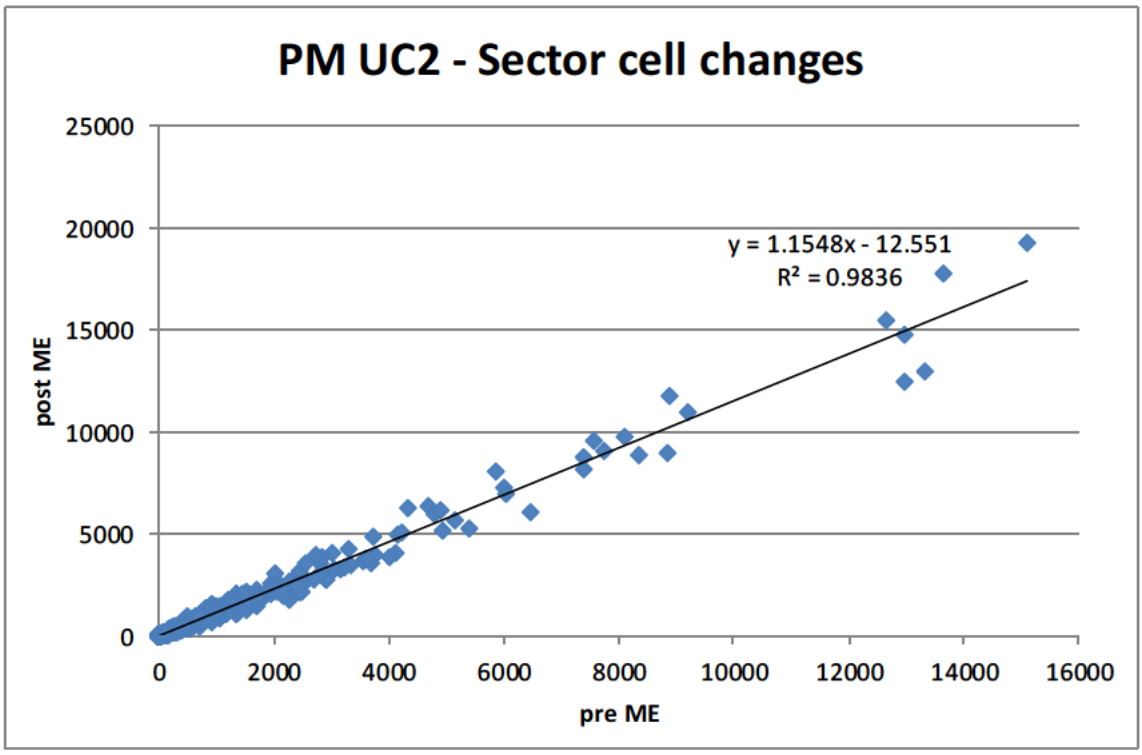


Figure 26: UC3

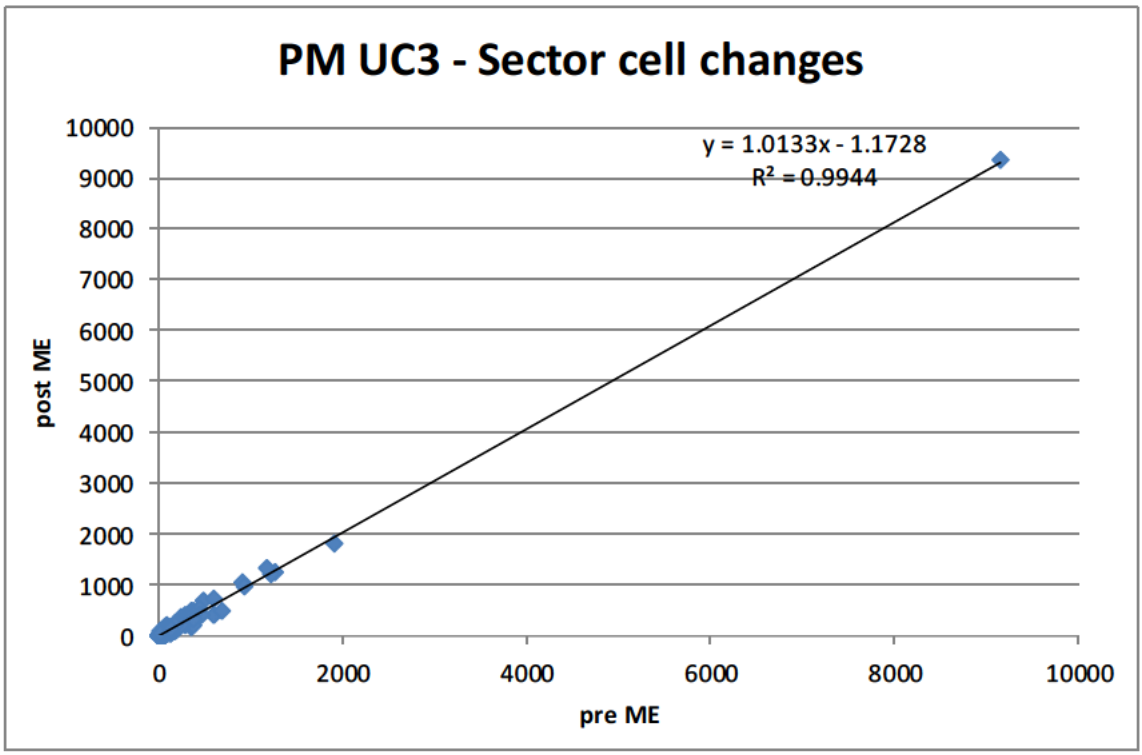


Figure 27: UC4

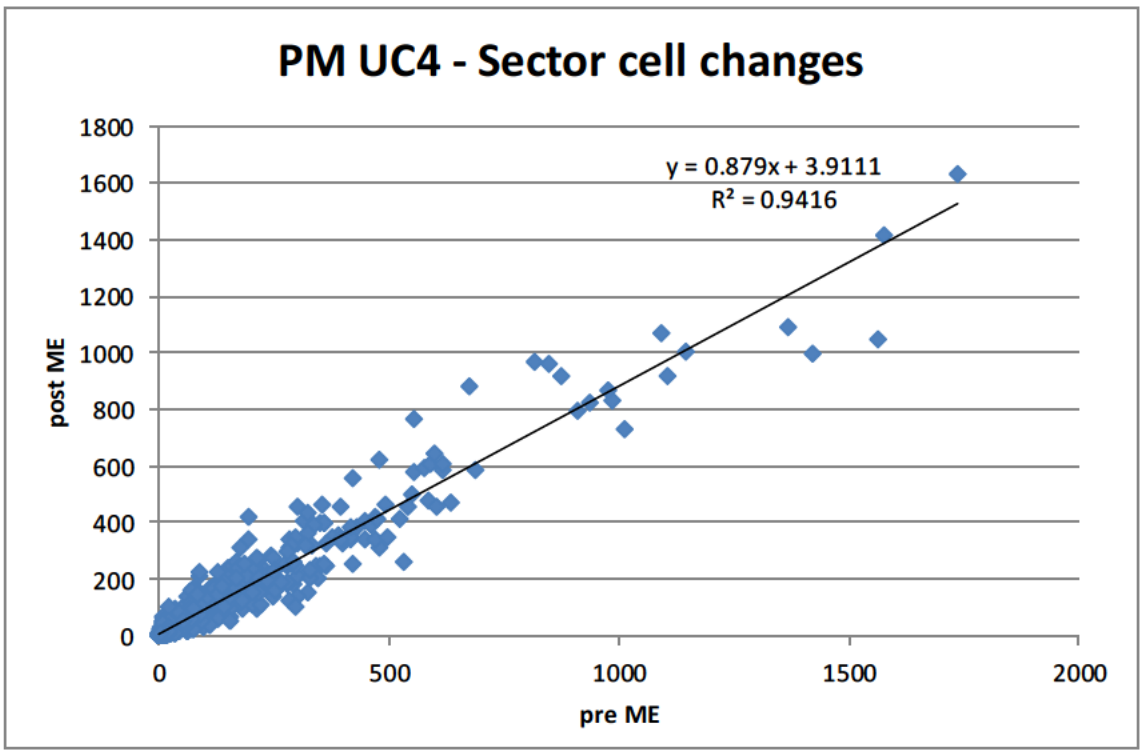
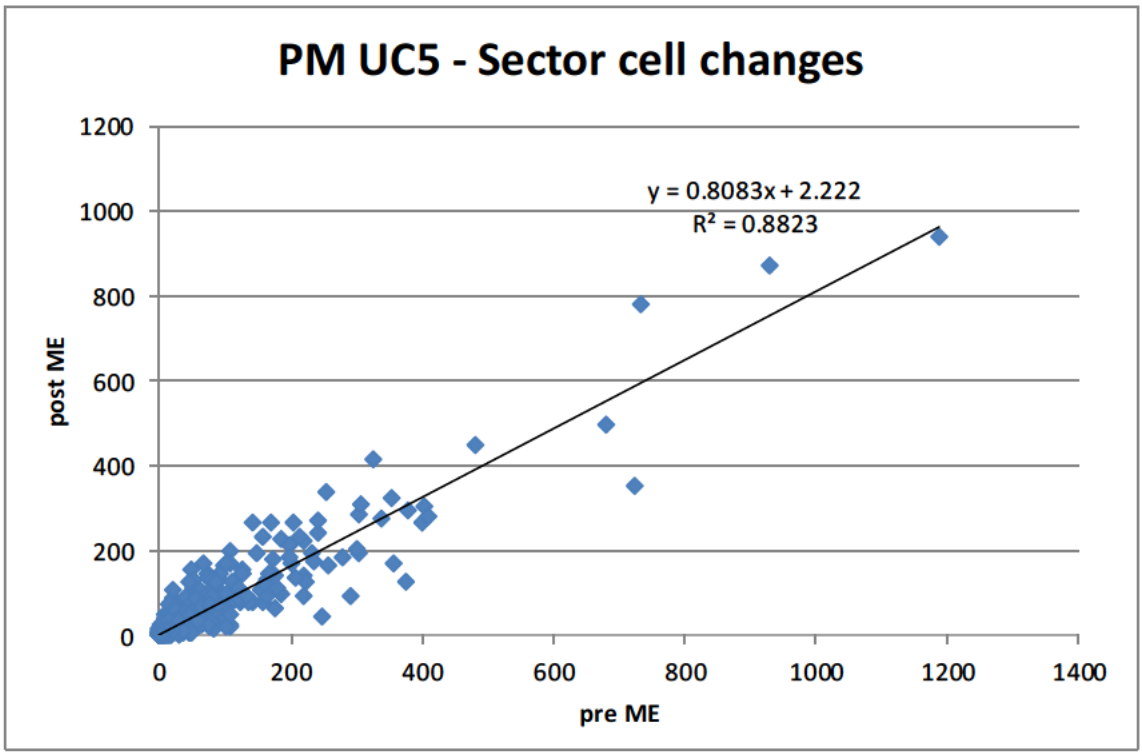


Figure 28: UC5



F. CLoHAM model link validation

Table 7: CLoHAM model link validation

SL Desc	Site	Direction	A node	B node	Observed	Modelled	GEH
Deptford	B2142 Endwell Road	1	24104	24099	308	463	7.9
Deptford	Vesta Road	1	24119	24109	158	20	14.6
Deptford	A2 New Cross Road	1	24123	24117	1190	1217	0.8
Deptford	B207 Sanford Street	1	24227	24226	194	172	1.6
Deptford	Arklow Road	1	24403	24401	100	47	
Deptford	A200 Evelyn Street	1	24465	24400	553	699	5.8
Deptford	B2142 Endwell Road	2	24099	24104	289	553	12.8
Deptford	Vesta Road	2	24109	24119	274	8	22.4
Deptford	A2 New Cross Road	2	24117	24123	1048	1243	5.8
Deptford	B207 Sanford Street	2	24226	24227	649	410	10.4
Deptford	Arklow Road	2	24401	24403	100	24	
Deptford	A200 Evelyn Street	2	24400	24465	629	880	9.1
VAL_Camberwell Rd	BRIXTON ROAD	1	28129	28400	555	635	3.3
VAL_Camberwell Rd	MANDELA STREET	1	29099	28601	8	17	2.5
VAL_Camberwell Rd	FOXLEY ROAD	1	28098	28061	171	151	1.5
VAL_Camberwell Rd	CAMBERWELL NEW ROAD	1	26471	26268	577	581	0.1
VAL_Camberwell Rd	CROWN STREET	1	26713	26714	95	104	0.9
VAL_Camberwell Rd	CAMBERWELL ROAD	1	27129	26591	680	714	1.3
VAL_Camberwell Rd	WELLS WAY	1	27396	26219	346	271	4.3
VAL_Camberwell Rd	TRAFALGAR AVENUE	1	27103	26218	438	446	0.4
VAL_Camberwell Rd	GLENGALL ROAD	1	27544	27541	82	0	12.8
VAL_Camberwell Rd	BRIXTON ROAD	2	28400	28129	705	626	3.1
VAL_Camberwell Rd	MANDELA STREET	2	28601	29099	7	135	15.2
VAL_Camberwell Rd	FOXLEY ROAD	2	28061	28098	204	210	0.5
VAL_Camberwell Rd	CAMBERWELL NEW ROAD	2	26268	26471	651	705	2.1
VAL_Camberwell Rd	CROWN STREET	2	26714	26713	159	102	5.0
VAL_Camberwell Rd	CAMBERWELL ROAD	2	26591	27129	524	586	2.6
VAL_Camberwell Rd	WELLS WAY	2	26219	27396	541	389	7.0
VAL_Camberwell Rd	TRAFALGAR AVENUE	2	26218	27103	307	352	2.5
VAL_Camberwell Rd	GLENGALL ROAD	2	27541	27544	91	147	5.2
Inner - East	A200 Creek Road	I	22857	22670	473	511	1.7
Inner - East	A2 Deptford Bridge	I	22001	24178	940	885	1.8
Inner - East	A20 Loampit Vale	I	24259	24157	856	866	0.4
Inner - East	B236 Vicars Hill	I	24336	24327	85	149	5.9
Inner - East	Adelaide Avenue	I	24106	24329	144	123	1.8
Inner - East	B218 Brockley Road	I	24228	24090	534	480	2.4
Inner - East	B238 Honor Oak Park	I	24050	24043	406	426	1.0
Inner - East	A205 Waldram Park Road	I	24033	24390	673	692	0.7

SL Desc	Site	Direction	A node	B node	Observed	Modelled	GEH
Inner - East	Westbourne Drive	I	24395	24390	46	0	9.6
Inner - East	B227 Perry Vale	I	24391	24023	328	384	3.0
Inner - East	A212 Sydenham Road	I	24507	24506	711	732	0.8
Inner - East	A200 Creek Road	O	22670	22857	860	794	2.3
Inner - East	A2 Deptford Bridge	O	24178	22001	1295	1290	0.1
Inner - East	A20 Loampit Vale	O	24157	24259	971	1051	2.5
Inner - East	B236 Vicars Hill	O	24327	24336	163	164	0.1
Inner - East	Adelaide Avenue	O	24329	24106	183	275	6.0
Inner - East	B218 Brockley Road	O	24090	24228	734	654	3.1
Inner - East	B238 Honor Oak Park	O	24043	24050	501	531	1.3
Inner - East	Stanstead Road	O	24371	24372	31	0	7.9
Inner - East	A205 Waldram Park Road	O	24390	24033	604	568	1.5
Inner - East	Westbourne Drive	O	24390	24395	151	0	17.4
Inner - East	B227 Perry Vale	O	24023	24391	617	516	4.2
Inner - East	A212 Sydenham Road	O	24506	24507	828	855	0.9
Central	A200 - Jamaica Road	I	26447	27047	376	393	0.9
Central	A100 - Tower Bridge Road	I	26189	27445	649	706	2.2
Central	A2205 - Bermondsey Street	I	26188	26507	148	260	7.9
Central	A2198 - Long Lane	I	26718	26564	202	80	10.2
Central	A2 - Great Dover Street - just north of Trinity Street	I	26505	26737	281	279	0.1
Central	Unc - Trinity Street - just north of Falmouth Road	I	26234	26215	25	2	6.1
Central	B242 - Harper Road	I	26666	27040	37	58	3.2
Central	A3 - Newington Causeway	I	26514	27439	411	379	1.6
Central	A201 - London Road	I	27028	27428	129	112	1.5
Central	A302 - St. Georges Road	I	27171	26673	604	632	1.2
Central	Unc - Dante Road - just south of Brook Drive	I	26298	26674	22	30	1.6
Central	A23 - Kennington Road - south of Brook Drive	I	29453	28391	396	385	0.6
Central	A3036 - Albert Embankment	I	28373	29439	616	491	5.3
Central	A202 - Vauxhall Bridge	I	13315	12009	1204	1241	1.1
Central	A200 - Jamaica Road	O	27047	26447	602	625	0.9
Central	A100 - Tower Bridge Road	O	27445	26189	793	816	0.8
Central	A2198 - Long Lane	O	26564	26718	596	578	0.7
Central	A2 - Great Dover Street - just north of Trinity Street	O	26737	26505	355	394	2.0
Central	Unc - Trinity Street - just north of Falmouth Road	O	26215	26234	98	68	3.2
Central	B242 - Harper Road	O	27040	26666	298	325	1.5
Central	A3 - Newington Causeway	O	27439	26514	713	537	7.0
Central	A201 - London Road	O	27428	27028	914	902	0.4
Central	Unc - Dante Road - just south of Brook Drive	O	26674	26298	86	85	0.1
Central	A23 - Kennington Road - south of Brook Drive	O	28004	28390	763	705	2.1
Central	A3036 - Albert Embankment	O	29439	28373	729	729	0.0

SL Desc	Site	Direction	A node	B node	Observed	Modelled	GEH
Central	A202 - Vauxhall Bridge	O	12009	13315	1625	1747	3.0
Thames(East)	A101 Rotherhithe Tunnel	NB	20187	20338	1002	1011	0.3
Thames(East)	A102 Blackwall Tunnel	NB	22126	20040	2825	3109	5.2
Thames(East)	Woolwich Ferry	NB	22211	22218	159	144	1.2
Thames(East)	A282 Dartford Crossing	NB	88593	88606	4746	5108	5.2
Thames(East)	A101 Rotherhithe Tunnel	SB	20338	20187	882	890	0.3
Thames(East)	A102 Blackwall Tunnel	SB	20872	22134	3394	3594	3.4
Thames(East)	Woolwich Ferry	SB	22218	22211	190	184	0.5
Thames(East)	A282 Dartford Crossing	SB	88608	88594	4870	5655	10.8
Peckham - Wapping	A202 Peckham Road between Kelly Avenue and Basing Court	EB	26340	26550	693	715	0.8
Peckham - Wapping	B216 Commercial Way, between Compton Cl & Bonar Rd	EB	26422	26131	438	390	2.4
Peckham - Wapping	B215 Willowbrook Rd, btwn Colegrave Rd & Sumner Rd	EB	26538	26669	643	562	3.3
Peckham - Wapping	A2 Old Kent Rd, between Cooper's Rd and Mawbey Street	EB	26147	27541	1178	1294	3.3
Peckham - Wapping	B204 Rolls Rd, between Rowcross St & Oxley Cl	EB	26479	26349	211	301	5.6
Peckham - Wapping	Lynton Rd, between Chaucer Dr & Balaclava Rd	EB	26566	26267	136	97	3.6
Peckham - Wapping	A2206, between B203 Dunton Rd & Balaclava Rd	EB	27066	26255	548	452	4.3
Peckham - Wapping	Spa Rd, between Enid St & Rouel Rd	EB	26181	26231	166	81	7.7
Peckham - Wapping	Enid St, between Cleaning Co-operative & Marine St	EB	26230	26231	87	263	13.3
Peckham - Wapping	B202 Abbey St, between Old Jamaica Rd & Druid St	EB	26190	26191	346	355	0.5
Peckham - Wapping	A200 Jamaica Rd, between Shad Thames & Mill St	EB	27047	26447	602	625	0.9
Peckham - Wapping	A202 Peckham Road between Kelly Avenue and Basing Court	WB	26550	26340	561	561	0.0
Peckham - Wapping	B216 Commercial Way, between Compton Cl & Bonar Rd	WB	26131	26422	320	336	0.9
Peckham - Wapping	B215 Willowbrook Rd, btwn Colegrave Rd & Sumner Rd	WB	26669	26538	330	339	0.5
Peckham - Wapping	A2 Old Kent Rd, between Cooper's Rd and Mawbey Street	WB	27541	26147	852	854	0.1
Peckham - Wapping	B204 Rolls Rd, between Rowcross St & Oxley Cl	WB	26349	26479	339	332	0.4
Peckham - Wapping	Lynton Rd, between Chaucer Dr & Balaclava Rd	WB	26267	26566	85	2	12.7
Peckham - Wapping	A2206, between B203 Dunton Rd & Balaclava Rd	WB	26255	27066	322	414	4.8
Peckham - Wapping	Spa Rd, between Enid St & Rouel Rd	WB	26231	26181	59	19	6.4
Peckham - Wapping	Enid St, between Cleaning Co-operative & Marine St	WB	26231	26230	108	76	3.3
Peckham - Wapping	B202 Abbey St, between Old Jamaica Rd & Druid St	WB	26191	26190	369	428	2.9
Peckham - Wapping	A200 Jamaica Rd, between Shad Thames & Mill St	WB	26447	27047	376	393	0.9
Deptford - Battersea	B206 (Grove St), btwn Evelyn St and Barnes Ter	I	24187	24195	107	99	0.7
Deptford - Battersea	Evelyn St, btwn Grimstead Rd and Oxestalls Rd	I	24189	24188	720	748	1.0
Deptford - Battersea	Trundley's Rd (B207), btwn Alloa Rd & Kezia St	I	24171	24182	158	269	7.6
Deptford - Battersea	Surrey Canal Rd, btwn Idderton Rd & Mercury Way	I	24152	26252	338	237	5.9

SL Desc	Site	Direction	A node	B node	Observed	Modelled	GEH
Deptford - Battersea	A2, btwn Chesterfield Way & Pomeroy St	I	25132	26140	724	750	0.9
Deptford - Battersea	A202, Asylum Rd & Lugard Rd	I	26135	26136	909	886	0.8
Deptford - Battersea	Gordon Rd, btwn Cossall Wk & Nazareth Cl	I	26416	26134	44	16	5.2
Deptford - Battersea	Consort Rd, btwn Coppeland Rd & Harders Rd	I	26109	26134	497	500	0.1
Deptford - Battersea	Rye Ln, btwn Holly Gr & Blenheim Gr	I	26155	26751	109	165	4.7
Deptford - Battersea	Lyndhurst Way, bwn Chadwick Rd & Holly Gv (& 2-76)	I	26092	26335	415	408	0.3
Deptford - Battersea	Camberwell Gr, McNeil Rd & Grovelands Cl	I	26374	26042	193	203	0.7
Deptford - Battersea	Grove Ln, btwn A2216 & Windsor Wk	I	26041	26054	8	0	4.0
Deptford - Battersea	Windsor Wk, btwn A2216 & Grove Ln	I	27244	27245	59	72	1.7
Deptford - Battersea	A215, btwn A2216 & Kings College Hospital	I	26443	26728	560	567	0.3
Deptford - Battersea	Herne Hill Rd, btwn Wadless Rd & Pafield Rd	I	28292	28581	240	337	5.7
Deptford - Battersea	B222 Hinton Rd, btwn A2217 & Wellfit St (& 5-74)	I	28291	28577	211	125	6.6
Deptford - Battersea	A2217, btwn Belinda Rd & Shakespear Rd	I	28729	28577	452	377	3.7
Deptford - Battersea	Barrington Rd, btwn A2217 & Brixton Station Rd	I	29122	29012	67	137	6.9
Deptford - Battersea	Gresham Road, btwn A2217 & Brixton Station Rd	I	29122	29003	104	70	3.7
Deptford - Battersea	Atlantic Rd	I	28565	28568	100	206	8.6
Deptford - Battersea	Brixton Rd, outside Brixton Rail Station	I	28564	28568	616	704	3.4
Deptford - Battersea	Ferndale Rd, btwn Pulross Rd & Bythorn St	I	28614	28559	140	156	1.4
Deptford - Battersea	Bedford Rd, btwn Lendal Terrace & Fendal Rd	I	28558	28553	327	302	1.4
Deptford - Battersea	Clapham High St, btwn Lendal Terrace & Voltaire Rd	I	28203	28177	811	754	2.0
Deptford - Battersea	Larkhall Rise, btwn Edgeley Rd & Killyon Rd	I	28961	28972	132	167	2.9
Deptford - Battersea	A3036, btwn Portslade Rd & Pensbury Pl	I	28316	28315	569	550	0.8
Deptford - Battersea	A3216, btwn Ingate Pl & Silverthorne Rd	I	30366	30403	486	478	0.4
Deptford - Battersea	Latchmere Rd, btwn Knowsley Rd & Sheepcote Ln	I	30993	30995	507	571	2.8
Deptford - Battersea	Battersea Pk Rd, Candahar Rd & Bullen St	I	30326	30115	686	704	0.7
Deptford - Battersea	Lombard Rd, Gwynne Rd & Vicarage Cr	I	30111	30260	500	515	0.7
Deptford - Battersea	B206 (Grove St), btwn Evelyn St and Barnes Ter	O	24195	24187	196	183	0.9
Deptford - Battersea	Evelyn St, btwn Grimstead Rd and Oxestalls Rd	O	24188	24189	630	621	0.4
Deptford - Battersea	Trundley's Rd (B207), btwn Alloa Rd & Kezia St	O	24182	24171	282	311	1.7
Deptford - Battersea	Surrey Canal Rd, btwn Idderton Rd & Mercury Way	O	26252	24152	775	633	5.4
Deptford - Battersea	A2, btwn Chesterfield Way & Pomeroy St	O	26140	25132	785	1027	8.0
Deptford - Battersea	A202, Asylum Rd & Lugard Rd	O	26136	26135	672	688	0.6
Deptford - Battersea	Gordon Rd, btwn Cossall Wk & Nazareth Cl	O	26134	26416	113	124	1.0
Deptford - Battersea	Consort Rd, btwn Coppeland Rd & Harders Rd	O	26134	26109	757	559	7.7

SL Desc	Site	Direction	A node	B node	Observed	Modelled	GEH
Deptford - Battersea	Rye Ln, btwn Holly Gr & Blenheim Gr	O	26751	26155	140	313	11.5
Deptford - Battersea	Bellenden Rd, btwn Chadwick Rd & Holly Gv (& 2-75)	O	26156	26093	552	447	4.7
Deptford - Battersea	Camberwell Gr, McNeil Rd & Grovelands Cl	O	26042	26374	281	251	1.9
Deptford - Battersea	Grove Ln, btwn A2216 & Windsor Wk	O	26054	26041	123	6	14.5
Deptford - Battersea	Windsor Wk, btwn A2216 & Grove Ln	O	27245	27244	17	64	7.3
Deptford - Battersea	A215, btwn A2216 & Kings College Hospital	O	26728	26443	637	707	2.7
Deptford - Battersea	Herne Hill Rd, btwn Wadless Rd & Pafield Rd	O	28581	28292	534	517	0.7
Deptford - Battersea	B222 Hinton Rd, btwn A2217 & Wellfit St (& 5-74)	O	28577	28291	336	345	0.5
Deptford - Battersea	A2217, btwn Belinda Rd & Shakespear Rd	O	28577	28729	446	425	1.0
Deptford - Battersea	Barrington Rd, btwn A2217 & Brixton Station Rd	O	29012	29122	211	90	9.9
Deptford - Battersea	Gresham Road, btwn A2217 & Brixton Station Rd	O	29003	29122	151	212	4.5
Deptford - Battersea	Atlantic Rd	O	28568	28565	100	142	3.9
Deptford - Battersea	Brixton Rd, outside Brixton Rail Station	O	28568	28564	718	767	1.8
Deptford - Battersea	Ferndale Rd, btwn Pulross Rd & Bythorn St	O	28559	28614	240	100	10.7
Deptford - Battersea	Bedford Rd, btwn Lendal Terrace & Fendal Rd	O	28553	28558	372	388	0.8
Deptford - Battersea	Clapham High St, btwn Lendal Terrace & Voltaire Rd	O	28177	28203	553	758	8.0
Deptford - Battersea	A3036, btwn Portslade Rd & Pensbury Pl	O	28315	28316	745	620	4.8
Deptford - Battersea	A3216, btwn Ingate Pl & Silverthorne Rd	O	30403	30366	669	756	3.3
Deptford - Battersea	Latchmere Rd, btwn Knowsley Rd & Sheepcote Ln	O	30995	30993	763	442	13.1
Deptford - Battersea	Battersea Pk Rd, Candahar Rd & Bullen St	O	30115	30326	607	598	0.3
Deptford - Battersea	Lombard Rd, Gwynne Rd & Vicarage Cr	O	30260	30111	525	562	1.6
Blackfriars - Herne Hill	A3200 Southwark St, between A201 & Hopton St	EB	27019	27200	499	513	0.6
Blackfriars - Herne Hill	Union St, between Nelson Sq & Great Suffolk St	EB	26306	27009	202	127	5.9
Blackfriars - Herne Hill	Webber St, between Glasshill St & Great Suffolk St	EB	27005	26511	66	16	7.8
Blackfriars - Herne Hill	S'wark Bridge Rd, btwn Belvedere Bdgs & Scovell Rd	EB	27004	27006	178	272	6.3
Blackfriars - Herne Hill	A3202, between S'wark Bridge Rd & Stone's End St	EB	27004	26318	410	413	0.1
Blackfriars - Herne Hill	A3, between Gaunt St & Avonmouth St	EB	27438	27040	433	308	6.5
Blackfriars - Herne Hill	A201 New Kent Rd, between A3 & Meadow Row	EB	27423	26330	1176	1278	2.9
Blackfriars - Herne Hill	A215 Walworth Rd, between A3 & Elephant Rd	EB	26652	27042	638	637	0.0
Blackfriars - Herne Hill	Manor Pl, between Occupation Rd & A215 Walworth Rd	EB	27359	26148	121	161	3.4
Blackfriars - Herne Hill	Penrose St, between Penrose Gr & A215 Walworth Rd	EB	27197	27198	96	32	8.0
Blackfriars - Herne Hill	Penrose St, between Carter St & Sutherland Square	EB	27197	26238	93	128	3.3
Blackfriars - Herne Hill	John Ruskin Rd, between Primary School & Pelier St	EB	27193	26720	171	107	5.5

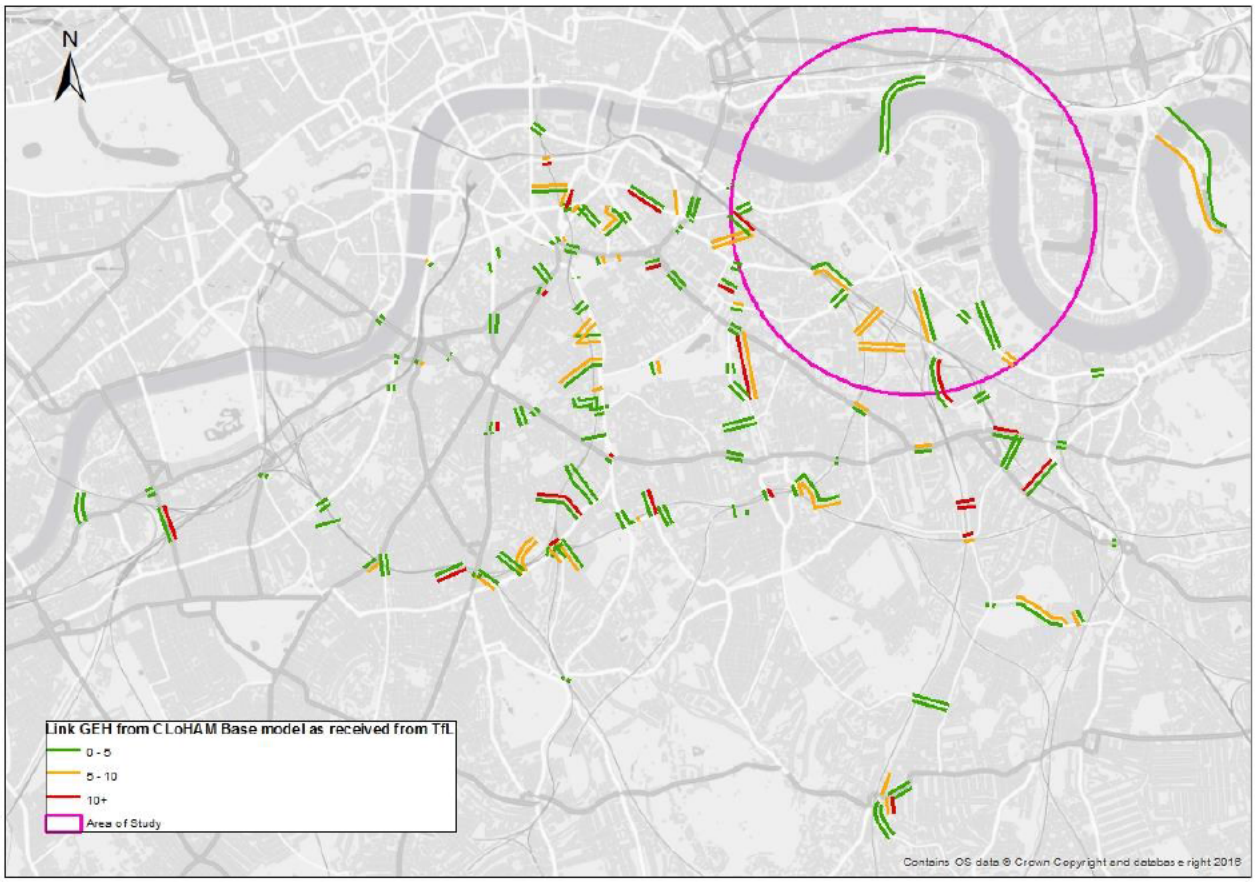
SL Desc	Site	Direction	A node	B node	Observed	Modelled	GEH
Blackfriars - Herne Hill	Bethwin Rd, between Sultan St & A215 Camberwell Rd	EB	26715	27135	68	29	5.7
Blackfriars - Herne Hill	Wyndham Rd, between Crown St & A215 Camberwell Rd	EB	26713	27129	443	518	3.4
Blackfriars - Herne Hill	Medlar St, btwn Badsworth Rd & A215 Camberwell Rd	EB	26341	26228	93	102	0.9
Blackfriars - Herne Hill	A202, between Medlar St & Camberwell Station Rd	EB	26663	26045	459	258	10.6
Blackfriars - Herne Hill	Denmark Rd, between Paulet Rd & Camberwell Stn Rd	EB	26653	28682	218	205	0.9
Blackfriars - Herne Hill	Lilford Rd, between Paulet Rd & Carew St	EB	29017	28580	134	283	10.3
Blackfriars - Herne Hill	A2217, between B222 Hinton Rd & Herne Hill Rd	EB	28577	28581	436	183	14.4
Blackfriars - Herne Hill	B222 Hinton Rd, btwn A2217 & Wellfit St (& 5-74)	EB	28577	28291	336	345	0.5
Blackfriars - Herne Hill	A215 railway underpass, between Railton Rd & B222	EB	26734	26026	738	808	2.5
Blackfriars - Herne Hill	A3200 Southwark St, between A201 & Hopton St	WB	27200	27019	512	530	0.8
Blackfriars - Herne Hill	Union St, between Nelson Sq & Great Suffolk St	WB	27009	26306	217	83	10.9
Blackfriars - Herne Hill	Webber St, between Glasshill St & Great Suffolk St	WB	26511	27005	63	34	4.1
Blackfriars - Herne Hill	S'wark Bridge Rd, btwn Belvedere Bdgs & Scovell Rd	WB	27006	27004	163	334	10.8
Blackfriars - Herne Hill	A3202, between S'wark Bridge Rd & Stone's End St	WB	26318	27004	153	159	0.5
Blackfriars - Herne Hill	A3, between Gaunt St & Avonmouth St	WB	27040	27438	351	360	0.4
Blackfriars - Herne Hill	A201 New Kent Rd, between A3 & Meadow Row	WB	26330	27423	1203	1221	0.5
Blackfriars - Herne Hill	A215 Walworth Rd, between A3 & Elephant Rd	WB	27042	26652	533	455	3.5
Blackfriars - Herne Hill	Manor Pl, between Occupation Rd & A215 Walworth Rd	WB	26148	27359	183	203	1.5
Blackfriars - Herne Hill	Penrose St, between Penrose Gr & A215 Walworth Rd	WB	27198	27197	52	7	8.2
Blackfriars - Herne Hill	Penrose St, between Carter St & Sutherland Square	WB	26238	27197	51	96	5.2
Blackfriars - Herne Hill	John Ruskin Rd, between Primary School & Pelier St	WB	26720	27193	234	181	3.7
Blackfriars - Herne Hill	Wyndham Rd, between Crown St & A215 Camberwell Rd	WB	27129	26713	413	443	1.5
Blackfriars - Herne Hill	A202, between Medlar St & Camberwell Station Rd	WB	26045	26663	540	543	0.1
Blackfriars - Herne Hill	Denmark Rd, between Paulet Rd & Camberwell Stn Rd	WB	28682	26653	115	96	1.8
Blackfriars - Herne Hill	Lilford Rd, between Paulet Rd & Carew St	WB	28580	29017	71	88	1.9
Blackfriars - Herne Hill	A2217, between B222 Hinton Rd & Herne Hill Rd	WB	28581	28577	432	446	0.7
Blackfriars - Herne Hill	B222 Hinton Rd, btwn A2217 & Wellfit St (& 5-74)	WB	28291	28577	211	125	6.6
Blackfriars - Herne Hill	A215 railway underpass, between Railton Rd & B222	WB	26026	26734	922	974	1.7
Deptford - St Johns	Raymouth Road - between Aspinden Road and A2208 Rotherhithe New Road	EB	26166	26164	344	430	4.3
Deptford - St Johns	Rotherhithe New Road - between Galleywall Road and Raymouth Road	EB	27568	26637	680	558	4.9
Deptford - St Johns	Bolina Rd	EB	26496	26377	10	65	9.0
Deptford - St Johns	Surrey Canal Road - between Mercury Way and Juno Way	EB	26252	24152	775	633	5.4

SL Desc	Site	Direction	A node	B node	Observed	Modelled	GEH
Deptford - St Johns	Sanford Street - south of Trundleys Road	SB	24226	24227	649	410	10.4
Deptford - St Johns	Edward St - between Milton Court Road and Amersham Grove	EB	24153	24403	587	550	1.6
Deptford - St Johns	A2 New Cross Road - between A20 Amersham Road and Amersham Vale	EB	24154	24169	614	894	10.2
Deptford - St Johns	Florence Road - between Lewisham Way and Alpha Road	EB	24142	24169	213	271	3.7
Deptford - St Johns	Friendly St - between Thornville Street and Albyn Road	EB	24136	24172	276	39	18.8
Deptford - St Johns	Raymouth Road - between Aspinden Road and A2208 Rotherhithe New Road	WB	26164	26166	185	116	5.6
Deptford - St Johns	Rotherhithe New Road - between Galleywall Road and Raymouth Road	WB	26637	27568	451	488	1.7
Deptford - St Johns	Bolina Rd	WB	26377	26496	10	76	10.0
Deptford - St Johns	Surrey Canal Road - between Mercury Way and Juno Way	WB	24152	26252	338	237	5.9
Deptford - St Johns	Sanford Street - south of Trundleys Road	NB	24227	24226	194	172	1.6
Deptford - St Johns	Edward St - between Milton Court Road and Amersham Grove	WB	24403	24153	238	233	0.3
Deptford - St Johns	A2 New Cross Road - between A20 Amersham Road and Amersham Vale	WB	24169	24154	625	617	0.3
Deptford - St Johns	Florence Road - between Lewisham Way and Alpha Road	WB	24169	24142	250	211	2.6
Deptford - St Johns	Friendly St - between Thornville Street and Albyn Road	WB	24172	24136	257	208	3.2
CCZ-south	Abbey Street	I	27496	26189	254	264	0.6
CCZ-south	Grange Road	I	26352	26565	317	344	1.5
CCZ-south	Old Kent Road	I	26154	27422	810	819	0.3
CCZ-south	Mason Street	I	26379	26235	3	5	0.8
CCZ-south	Rodney Place	I	26504	26331	64	67	0.4
CCZ-south	Walworth Road	I	27042	26652	533	455	3.5
CCZ-south	Kennington Park Road	I	26337	27427	537	582	1.9
CCZ-south	Kennington Road	I	28381	28143	424	395	1.4
CCZ-south	Harleyford Road	I	28329	28135	736	715	0.8
CCZ-south	South Lambeth Road	I	28536	28488	451	467	0.7
CCZ-south	Wandsworth Road	I	29187	28309	425	411	0.7
CCZ-south	Nine Elms Lane	I	28318	28130	827	801	0.9
CCZ-south	Abbey Street	O	26189	27496	421	375	2.3
CCZ-south	Grange Road	O	26565	26352	328	334	0.3
CCZ-south	Old Kent Road	O	27422	26154	1287	1452	4.5
CCZ-south	Mason Street	O	26235	26379	8	93	11.9
CCZ-south	Balfour Street	O	26233	26506	29	67	5.5
CCZ-south	Rodney Place	O	26331	26504	36	7	6.3
CCZ-south	Walworth Road	O	26652	27042	638	637	0.0
CCZ-south	Kennington Park Road	O	27427	26337	585	892	11.3
CCZ-south	Kennington Road	O	28143	28381	583	559	1.0
CCZ-south	Harleyford Road	O	28135	28329	589	592	0.1

SL Desc	Site	Direction	A node	B node	Observed	Modelled	GEH
CCZ-south	South Lambeth Road	O	28488	28536	507	638	5.5
CCZ-south	Wandsworth Road	O	28309	29187	502	497	0.3
CCZ-south	Nine Elms Lane	O	28130	28318	730	738	0.3

Source: Dashboard_v3.69.4_CLoHAM_R003_AsReceivedFromTfL.xlsm

Figure 29: CLoHAM base model GEH



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G. Canada Water model link validation

Table 8: Canada Water model link validation

SL Desc	Site	Direction	A node	B node	Observed	Modelled	GEH
Deptford	B2142 Endwell Road	1	24104	24099	308	446	7.1
Deptford	Vesta Road	1	24119	24109	158	30	13.1
Deptford	A2 New Cross Road	1	24123	24117	1190	1246	1.6
Deptford	B207 Sanford Street	1	24227	24226	194	212	1.3
Deptford	Arklow Road	1	24403	24401	100	54	
Deptford	A200 Evelyn Street	1	24465	24400	553	581	1.2
Deptford	B2142 Endwell Road	2	24099	24104	289	559	13.1
Deptford	Vesta Road	2	24109	24119	274	9	22.3
Deptford	A2 New Cross Road	2	24117	24123	1048	1184	4.1
Deptford	B207 Sanford Street	2	24226	24227	649	491	6.6
Deptford	Arklow Road	2	24401	24403	100	17	
Deptford	A200 Evelyn Street	2	24400	24465	629	877	9.0
VAL_Camberwell Rd	BRIXTON ROAD	1	28129	28400	555	652	4.0
VAL_Camberwell Rd	MANDELA STREET	1	29099	28601	8	15	2.1
VAL_Camberwell Rd	FOXLEY ROAD	1	28098	28061	171	134	3.0
VAL_Camberwell Rd	CAMBERWELL NEW ROAD	1	26471	26268	577	592	0.6
VAL_Camberwell Rd	CROWN STREET	1	26713	26714	95	104	0.9
VAL_Camberwell Rd	CAMBERWELL ROAD	1	27129	26591	680	724	1.7
VAL_Camberwell Rd	WELLS WAY	1	27396	26219	346	273	4.2
VAL_Camberwell Rd	TRAFALGAR AVENUE	1	27103	26218	438	439	0.1
VAL_Camberwell Rd	GLENGALL ROAD	1	27544	27541	82	0	12.8
VAL_Camberwell Rd	BRIXTON ROAD	2	28400	28129	705	606	3.9
VAL_Camberwell Rd	MANDELA STREET	2	28601	29099	7	137	15.4
VAL_Camberwell Rd	FOXLEY ROAD	2	28061	28098	204	213	0.6
VAL_Camberwell Rd	CAMBERWELL NEW ROAD	2	26268	26471	651	708	2.2
VAL_Camberwell Rd	CROWN STREET	2	26714	26713	159	100	5.1
VAL_Camberwell Rd	CAMBERWELL ROAD	2	26591	27129	524	603	3.3
VAL_Camberwell Rd	WELLS WAY	2	26219	27396	541	391	6.9
VAL_Camberwell Rd	TRAFALGAR AVENUE	2	26218	27103	307	359	2.9
VAL_Camberwell Rd	GLENGALL ROAD	2	27541	27544	91	131	3.8
Inner - East	A200 Creek Road	I	22857	22670	473	392	3.9
Inner - East	A2 Deptford Bridge	I	22001	24178	940	913	0.9
Inner - East	A20 Loampit Vale	I	24259	24157	856	886	1.0
Inner - East	B236 Vicars Hill	I	24336	24327	85	143	5.4
Inner - East	Adelaide Avenue	I	24106	24329	144	122	1.9
Inner - East	B218 Brockley Road	I	24228	24090	534	492	1.9
Inner - East	B238 Honor Oak Park	I	24050	24043	406	435	1.4
Inner - East	A205 Waldram Park Road	I	24033	24390	673	692	0.7

Inner - East	Westbourne Drive	I	24395	24390	46	0	9.6
Inner - East	B227 Perry Vale	I	24391	24023	328	384	3.0
Inner - East	A212 Sydenham Road	I	24507	24506	711	733	0.8
Inner - East	A200 Creek Road	O	22670	22857	860	863	0.1
Inner - East	A2 Deptford Bridge	O	24178	22001	1295	1351	1.5
Inner - East	A20 Loampit Vale	O	24157	24259	971	957	0.4
Inner - East	B236 Vicars Hill	O	24327	24336	163	147	1.3
Inner - East	Adelaide Avenue	O	24329	24106	183	283	6.5
Inner - East	B218 Brockley Road	O	24090	24228	734	650	3.2
Inner - East	B238 Honor Oak Park	O	24043	24050	501	540	1.7
Inner - East	Stanstead Road	O	24371	24372	31	0	7.9
Inner - East	A205 Waldram Park Road	O	24390	24033	604	562	1.7
Inner - East	Westbourne Drive	O	24390	24395	151	0	17.4
Inner - East	B227 Perry Vale	O	24023	24391	617	508	4.6
Inner - East	A212 Sydenham Road	O	24506	24507	828	853	0.9
Central	A200 - Jamaica Road	I	26447	27047	376	363	0.6
Central	A100 - Tower Bridge Road	I	26189	27445	649	696	1.8
Central	A2205 - Bermondsey Street	I	26188	26507	148	263	8.0
Central	A2198 - Long Lane	I	26718	26564	202	91	9.2
Central	A2 - Great Dover Street - just north of Trinity Street	I	26505	26737	281	294	0.8
Central	Unc - Trinity Street - just north of Falmouth Road	I	26234	26215	25	3	5.9
Central	B242 - Harper Road	I	26666	27040	37	59	3.3
Central	A3 - Newington Causeway	I	26514	27439	411	384	1.3
Central	A201 - London Road	I	27028	27428	129	113	1.5
Central	A302 - St. Georges Road	I	27171	26673	604	634	1.2
Central	Unc - Dante Road - just south of Brook Drive	I	26298	26674	22	37	2.8
Central	A23 - Kennington Road - south of Brook Drive	I	29453	28391	396	383	0.6
Central	A3036 - Albert Embankment	I	28373	29439	616	493	5.2
Central	A202 - Vauxhall Bridge	I	13315	12009	1204	1228	0.7
Central	A200 - Jamaica Road	O	27047	26447	602	627	1.0
Central	A100 - Tower Bridge Road	O	27445	26189	793	821	1.0
Central	A2198 - Long Lane	O	26564	26718	596	600	0.2
Central	A2 - Great Dover Street - just north of Trinity Street	O	26737	26505	355	405	2.6
Central	Unc - Trinity Street - just north of Falmouth Road	O	26215	26234	98	62	4.0
Central	B242 - Harper Road	O	27040	26666	298	338	2.3
Central	A3 - Newington Causeway	O	27439	26514	713	532	7.2
Central	A201 - London Road	O	27428	27028	914	901	0.4
Central	Unc - Dante Road - just south of Brook Drive	O	26674	26298	86	90	0.4
Central	A23 - Kennington Road - south of Brook Drive	O	28004	28390	763	697	2.4
Central	A3036 - Albert Embankment	O	29439	28373	729	723	0.2
Central	A202 - Vauxhall Bridge	O	12009	13315	1625	1743	2.9

Thames(East)	A101 Rotherhithe Tunnel	NB	20187	20338	1002	1000	0.1
Thames(East)	A102 Blackwall Tunnel	NB	22126	20040	2825	3110	5.2
Thames(East)	Woolwich Ferry	NB	22211	22218	159	142	1.4
Thames(East)	A282 Dartford Crossing	NB	88593	88606	4746	5115	5.3
Thames(East)	A101 Rotherhithe Tunnel	SB	20338	20187	882	929	1.6
Thames(East)	A102 Blackwall Tunnel	SB	20872	22134	3394	3602	3.5
Thames(East)	Woolwich Ferry	SB	22218	22211	190	186	0.3
Thames(East)	A282 Dartford Crossing	SB	88608	88594	4870	5669	11.0
Peckham - Wapping	A202 Peckham Road between Kelly Avenue and Basing Court	EB	26340	26550	693	743	1.9
Peckham - Wapping	B216 Commercial Way, between Compton Cl & Bonar Rd	EB	26422	26131	438	399	1.9
Peckham - Wapping	B215 Willowbrook Rd, btwn Colegrave Rd & Sumner Rd	EB	26538	26669	643	549	3.8
Peckham - Wapping	A2 Old Kent Rd, between Cooper's Rd and Mawbey Street	EB	26147	27541	1178	1251	2.1
Peckham - Wapping	B204 Rolls Rd, between Rowcross St & Oxley Cl	EB	26479	26349	211	291	5.0
Peckham - Wapping	Lynton Rd, between Chaucer Dr & Balaclava Rd	EB	26566	26267	136	138	0.2
Peckham - Wapping	A2206, between B203 Dunton Rd & Balaclava Rd	EB	27066	26255	548	463	3.8
Peckham - Wapping	Spa Rd, between Enid St & Rouel Rd	EB	26181	26231	166	84	7.3
Peckham - Wapping	Enid St, between Cleaning Co-operative & Marine St	EB	26230	26231	87	269	13.6
Peckham - Wapping	B202 Abbey St, between Old Jamaica Rd & Druid St	EB	26190	26191	346	363	0.9
Peckham - Wapping	A200 Jamaica Rd, between Shad Thames & Mill St	EB	27047	26447	602	627	1.0
Peckham - Wapping	A202 Peckham Road between Kelly Avenue and Basing Court	WB	26550	26340	561	561	0.0
Peckham - Wapping	B216 Commercial Way, between Compton Cl & Bonar Rd	WB	26131	26422	320	341	1.1
Peckham - Wapping	B215 Willowbrook Rd, btwn Colegrave Rd & Sumner Rd	WB	26669	26538	330	333	0.2
Peckham - Wapping	A2 Old Kent Rd, between Cooper's Rd and Mawbey Street	WB	27541	26147	852	871	0.6
Peckham - Wapping	B204 Rolls Rd, between Rowcross St & Oxley Cl	WB	26349	26479	339	300	2.2
Peckham - Wapping	Lynton Rd, between Chaucer Dr & Balaclava Rd	WB	26267	26566	85	45	5.0
Peckham - Wapping	A2206, between B203 Dunton Rd & Balaclava Rd	WB	26255	27066	322	372	2.7
Peckham - Wapping	Spa Rd, between Enid St & Rouel Rd	WB	26231	26181	59	18	6.5
Peckham - Wapping	Enid St, between Cleaning Co-operative & Marine St	WB	26231	26230	108	81	2.7
Peckham - Wapping	B202 Abbey St, between Old Jamaica Rd & Druid St	WB	26191	26190	369	431	3.1
Peckham - Wapping	A200 Jamaica Rd, between Shad Thames & Mill St	WB	26447	27047	376	363	0.6
Deptford - Battersea	B206 (Grove St), btwn Evelyn St and Barnes Ter	I	24187	24195	107	97	1.0
Deptford - Battersea	Evelyn St, btwn Grimstead Rd and Oxestalls Rd	I	24189	24188	720	674	1.7
Deptford - Battersea	Trundley's Rd (B207), btwn Alloa Rd & Kezia St	I	24171	24182	158	221	4.5
Deptford - Battersea	Surrey Canal Rd, btwn Idderton Rd & Mercury Way	I	24152	26252	338	268	4.0
Deptford - Battersea	A2, btwn Chesterfield Way & Pomeroy St	I	25132	26140	724	786	2.2

Deptford - Battersea	A202, Asylum Rd & Lugard Rd	I	26135	26136	909	880	1.0
Deptford - Battersea	Gordon Rd, btwn Cossall Wk & Nazareth Cl	I	26416	26134	44	16	5.2
Deptford - Battersea	Consort Rd, btwn Coppeland Rd & Harders Rd	I	26109	26134	497	508	0.5
Deptford - Battersea	Rye Ln, btwn Holly Gr & Blenheim Gr	I	26155	26751	109	159	4.3
Deptford - Battersea	Lyndhurst Way, bwn Chadwick Rd & Holly Gv (& 2-76)	I	26092	26335	415	430	0.7
Deptford - Battersea	Camberwell Gr, McNeil Rd & Grovelands Cl	I	26374	26042	193	203	0.7
Deptford - Battersea	Grove Ln, btwn A2216 & Windsor Wk	I	26041	26054	8	0	4.0
Deptford - Battersea	Windsor Wk, btwn A2216 & Grove Ln	I	27244	27245	59	75	2.0
Deptford - Battersea	A215, btwn A2216 & Kings College Hospital	I	26443	26728	560	547	0.5
Deptford - Battersea	Herne Hill Rd, btwn Wadless Rd & Pafield Rd	I	28292	28581	240	337	5.7
Deptford - Battersea	B222 Hinton Rd, btwn A2217 & Wellfit St (& 5-74)	I	28291	28577	211	121	6.9
Deptford - Battersea	A2217, btwn Belinda Rd & Shakespear Rd	I	28729	28577	452	368	4.1
Deptford - Battersea	Barrington Rd, btwn A2217 & Brixton Station Rd	I	29122	29012	67	112	4.7
Deptford - Battersea	Gresham Road, btwn A2217 & Brixton Station Rd	I	29122	29003	104	74	3.2
Deptford - Battersea	Atlantic Rd	I	28565	28568	100	207	8.7
Deptford - Battersea	Brixton Rd, outside Brixton Rail Station	I	28564	28568	616	719	4.0
Deptford - Battersea	Ferndale Rd, btwn Pulross Rd & Bythorn St	I	28614	28559	140	163	1.9
Deptford - Battersea	Bedford Rd, btwn Lendal Terrace & Fendal Rd	I	28558	28553	327	305	1.2
Deptford - Battersea	Clapham High St, btwn Lendal Terrace & Voltaire Rd	I	28203	28177	811	744	2.4
Deptford - Battersea	Larkhall Rise, btwn Edgeley Rd & Killyon Rd	I	28961	28972	132	157	2.1
Deptford - Battersea	A3036, btwn Portslade Rd & Pensbury Pl	I	28316	28315	569	552	0.7
Deptford - Battersea	A3216, btwn Ingate Pl & Silverthorne Rd	I	30366	30403	486	486	0.0
Deptford - Battersea	Latchmere Rd, btwn Knowsley Rd & Sheepcote Ln	I	30993	30995	507	570	2.7
Deptford - Battersea	Battersea Pk Rd, Candahar Rd & Bullen St	I	30326	30115	686	703	0.6
Deptford - Battersea	Lombard Rd, Gwynne Rd & Vicarage Cr	I	30111	30260	500	509	0.4
Deptford - Battersea	B206 (Grove St), btwn Evelyn St and Barnes Ter	O	24195	24187	196	154	3.2
Deptford - Battersea	Evelyn St, btwn Grimstead Rd and Oxestalls Rd	O	24188	24189	630	662	1.3
Deptford - Battersea	Trundley's Rd (B207), btwn Alloa Rd & Kezia St	O	24182	24171	282	368	4.8
Deptford - Battersea	Surrey Canal Rd, btwn Idderton Rd & Mercury Way	O	26252	24152	775	612	6.2
Deptford - Battersea	A2, btwn Chesterfield Way & Pomeroy St	O	26140	25132	785	995	7.1
Deptford - Battersea	A202, Asylum Rd & Lugard Rd	O	26136	26135	672	678	0.2
Deptford - Battersea	Gordon Rd, btwn Cossall Wk & Nazareth Cl	O	26134	26416	113	112	0.1
Deptford - Battersea	Consort Rd, btwn Coppeland Rd & Harders Rd	O	26134	26109	757	566	7.4
Deptford - Battersea	Rye Ln, btwn Holly Gr & Blenheim Gr	O	26751	26155	140	317	11.7
Deptford - Battersea	Bellenden Rd, btwn Chadwick Rd & Holly Gv (& 2-75)	O	26156	26093	552	436	5.2

Deptford - Battersea	Camberwell Gr, McNeil Rd & Grovelands Cl	O	26042	26374	281	250	1.9
Deptford - Battersea	Grove Ln, btwn A2216 & Windsor Wk	O	26054	26041	123	6	14.5
Deptford - Battersea	Windsor Wk, btwn A2216 & Grove Ln	O	27245	27244	17	67	7.7
Deptford - Battersea	A215, btwn A2216 & Kings College Hospital	O	26728	26443	637	739	3.9
Deptford - Battersea	Herne Hill Rd, btwn Wadless Rd & Pafield Rd	O	28581	28292	534	512	1.0
Deptford - Battersea	B222 Hinton Rd, btwn A2217 & Wellfit St (& 5-74)	O	28577	28291	336	307	1.6
Deptford - Battersea	A2217, btwn Belinda Rd & Shakespear Rd	O	28577	28729	446	438	0.4
Deptford - Battersea	Barrington Rd, btwn A2217 & Brixton Station Rd	O	29012	29122	211	91	9.8
Deptford - Battersea	Gresham Road, btwn A2217 & Brixton Station Rd	O	29003	29122	151	210	4.4
Deptford - Battersea	Atlantic Rd	O	28568	28565	100	140	3.7
Deptford - Battersea	Brixton Rd, outside Brixton Rail Station	O	28568	28564	718	769	1.9
Deptford - Battersea	Ferndale Rd, btwn Pulross Rd & Bythorn St	O	28559	28614	240	100	10.8
Deptford - Battersea	Bedford Rd, btwn Lendal Terrace & Fendal Rd	O	28553	28558	372	387	0.8
Deptford - Battersea	Clapham High St, btwn Lendal Terrace & Voltaire Rd	O	28177	28203	553	762	8.2
Deptford - Battersea	A3036, btwn Portslade Rd & Pensbury Pl	O	28315	28316	745	618	4.9
Deptford - Battersea	A3216, btwn Ingate Pl & Silverthorne Rd	O	30403	30366	669	758	3.4
Deptford - Battersea	Latchmere Rd, btwn Knowsley Rd & Sheepcote Ln	O	30995	30993	763	438	13.3
Deptford - Battersea	Battersea Pk Rd, Candahar Rd & Bullen St	O	30115	30326	607	603	0.2
Deptford - Battersea	Lombard Rd, Gwynne Rd & Vicarage Cr	O	30260	30111	525	559	1.4
Blackfriars - Herne Hill	A3200 Southwark St, between A201 & Hopton St	EB	27019	27200	499	528	1.2
Blackfriars - Herne Hill	Union St, between Nelson Sq & Great Suffolk St	EB	26306	27009	202	119	6.5
Blackfriars - Herne Hill	Webber St, between Glasshill St & Great Suffolk St	EB	27005	26511	66	15	8.0
Blackfriars - Herne Hill	S'wark Bridge Rd, btwn Belvedere Bdgs & Scovell Rd	EB	27004	27006	178	261	5.6
Blackfriars - Herne Hill	A3202, between S'wark Bridge Rd & Stone's End St	EB	27004	26318	410	424	0.7
Blackfriars - Herne Hill	A3, between Gaunt St & Avonmouth St	EB	27438	27040	433	308	6.5
Blackfriars - Herne Hill	A201 New Kent Rd, between A3 & Meadow Row	EB	27423	26330	1176	1281	3.0
Blackfriars - Herne Hill	A215 Walworth Rd, between A3 & Elephant Rd	EB	26652	27042	638	629	0.4
Blackfriars - Herne Hill	Manor Pl, between Occupation Rd & A215 Walworth Rd	EB	27359	26148	121	155	2.9
Blackfriars - Herne Hill	Penrose St, between Penrose Gr & A215 Walworth Rd	EB	27197	27198	96	31	8.2
Blackfriars - Herne Hill	Penrose St, between Carter St & Sutherland Square	EB	27197	26238	93	138	4.2
Blackfriars - Herne Hill	John Ruskin Rd, between Primary School & Pelier St	EB	27193	26720	171	114	4.8
Blackfriars - Herne Hill	Bethwin Rd, between Sultan St & A215 Camberwell Rd	EB	26715	27135	68	24	6.5
Blackfriars - Herne Hill	Wyndham Rd, between Crown St & A215 Camberwell Rd	EB	26713	27129	443	511	3.2
Blackfriars - Herne Hill	Medlar St, btwn Badsworth Rd & A215 Camberwell Rd	EB	26341	26228	93	97	0.4

Blackfriars - Herne Hill	A202, between Medlar St & Camberwell Station Rd	EB	26663	26045	459	383	3.7
Blackfriars - Herne Hill	Denmark Rd, between Paulet Rd & Camberwell Stn Rd	EB	26653	28682	218	167	3.6
Blackfriars - Herne Hill	Lilford Rd, between Paulet Rd & Carew St	EB	29017	28580	134	252	8.5
Blackfriars - Herne Hill	A2217, between B222 Hinton Rd & Herne Hill Rd	EB	28577	28581	436	201	13.2
Blackfriars - Herne Hill	B222 Hinton Rd, btwn A2217 & Wellfit St (& 5-74)	EB	28577	28291	336	307	1.6
Blackfriars - Herne Hill	A215 railway underpass, between Railton Rd & B222	EB	26734	26026	738	816	2.8
Blackfriars - Herne Hill	A3200 Southwark St, between A201 & Hopton St	WB	27200	27019	512	518	0.3
Blackfriars - Herne Hill	Union St, between Nelson Sq & Great Suffolk St	WB	27009	26306	217	91	10.1
Blackfriars - Herne Hill	Webber St, between Glasshill St & Great Suffolk St	WB	26511	27005	63	37	3.7
Blackfriars - Herne Hill	S'wark Bridge Rd, btwn Belvedere Bdgs & Scovell Rd	WB	27006	27004	163	327	10.4
Blackfriars - Herne Hill	A3202, between S'wark Bridge Rd & Stone's End St	WB	26318	27004	153	152	0.1
Blackfriars - Herne Hill	A3, between Gaunt St & Avonmouth St	WB	27040	27438	351	350	0.1
Blackfriars - Herne Hill	A201 New Kent Rd, between A3 & Meadow Row	WB	26330	27423	1203	1227	0.7
Blackfriars - Herne Hill	A215 Walworth Rd, between A3 & Elephant Rd	WB	27042	26652	533	454	3.6
Blackfriars - Herne Hill	Manor Pl, between Occupation Rd & A215 Walworth Rd	WB	26148	27359	183	193	0.8
Blackfriars - Herne Hill	Penrose St, between Penrose Gr & A215 Walworth Rd	WB	27198	27197	52	7	8.4
Blackfriars - Herne Hill	Penrose St, between Carter St & Sutherland Square	WB	26238	27197	51	93	4.9
Blackfriars - Herne Hill	John Ruskin Rd, between Primary School & Pelier St	WB	26720	27193	234	181	3.7
Blackfriars - Herne Hill	Wyndham Rd, between Crown St & A215 Camberwell Rd	WB	27129	26713	413	443	1.5
Blackfriars - Herne Hill	A202, between Medlar St & Camberwell Station Rd	WB	26045	26663	540	548	0.3
Blackfriars - Herne Hill	Denmark Rd, between Paulet Rd & Camberwell Stn Rd	WB	28682	26653	115	77	3.9
Blackfriars - Herne Hill	Lilford Rd, between Paulet Rd & Carew St	WB	28580	29017	71	96	2.8
Blackfriars - Herne Hill	A2217, between B222 Hinton Rd & Herne Hill Rd	WB	28581	28577	432	430	0.1
Blackfriars - Herne Hill	B222 Hinton Rd, btwn A2217 & Wellfit St (& 5-74)	WB	28291	28577	211	121	6.9
Blackfriars - Herne Hill	A215 railway underpass, between Railton Rd & B222	WB	26026	26734	922	961	1.3
Deptford - St Johns	Raymouth Road - between Aspinden Road and A2208 Rotherhithe New Road	EB	26166	26164	344	447	5.2
Deptford - St Johns	Rotherhithe New Road - between Galleywall Road and Raymouth Road	EB	27568	26637	680	601	3.1
Deptford - St Johns	Bolina Rd	EB	26496	26377	10	0	4.5
Deptford - St Johns	Surrey Canal Road - between Mercury Way and Juno Way	EB	26252	24152	775	612	6.2
Deptford - St Johns	Sanford Street - south of Trundleys Road	SB	24226	24227	649	491	6.6
Deptford - St Johns	Edward St - between Milton Court Road and Amersham Grove	EB	24153	24403	587	545	1.8
Deptford - St Johns	A2 New Cross Road - between A20 Amersham Road and Amersham Vale	EB	24154	24169	614	896	10.2

Deptford - St Johns	Florence Road - between Lewisham Way and Alpha Road	EB	24142	24169	213	274	3.9
Deptford - St Johns	Friendly St - between Thornville Street and Albyn Road	EB	24136	24172	276	117	11.3
Deptford - St Johns	Raymouth Road - between Aspinden Road and A2208 Rotherhithe New Road	WB	26164	26166	185	100	7.1
Deptford - St Johns	Rotherhithe New Road - between Galleywall Road and Raymouth Road	WB	26637	27568	451	562	5.0
Deptford - St Johns	Bolina Rd	WB	26377	26496	10	0	4.5
Deptford - St Johns	Surrey Canal Road - between Mercury Way and Juno Way	WB	24152	26252	338	268	4.0
Deptford - St Johns	Sanford Street - south of Trundleys Road	NB	24227	24226	194	212	1.3
Deptford - St Johns	Edward St - between Milton Court Road and Amersham Grove	WB	24403	24153	238	236	0.1
Deptford - St Johns	A2 New Cross Road - between A20 Amersham Road and Amersham Vale	WB	24169	24154	625	633	0.3
Deptford - St Johns	Florence Road - between Lewisham Way and Alpha Road	WB	24169	24142	250	201	3.3
Deptford - St Johns	Friendly St - between Thornville Street and Albyn Road	WB	24172	24136	257	286	1.8
CCZ-south	Abbey Street	I	27496	26189	254	253	0.1
CCZ-south	Grange Road	I	26352	26565	317	328	0.6
CCZ-south	Old Kent Road	I	26154	27422	810	839	1.0
CCZ-south	Mason Street	I	26379	26235	3	7	1.7
CCZ-south	Rodney Place	I	26504	26331	64	61	0.4
CCZ-south	Walworth Road	I	27042	26652	533	454	3.6
CCZ-south	Kennington Park Road	I	26337	27427	537	582	1.9
CCZ-south	Kennington Road	I	28381	28143	424	397	1.3
CCZ-south	Harleyford Road	I	28329	28135	736	721	0.6
CCZ-south	South Lambeth Road	I	28536	28488	451	456	0.2
CCZ-south	Wandsworth Road	I	29187	28309	425	409	0.8
CCZ-south	Nine Elms Lane	I	28318	28130	827	805	0.8
CCZ-south	Abbey Street	O	26189	27496	421	366	2.8
CCZ-south	Grange Road	O	26565	26352	328	334	0.3
CCZ-south	Old Kent Road	O	27422	26154	1287	1463	4.8
CCZ-south	Mason Street	O	26235	26379	8	70	9.9
CCZ-south	Balfour Street	O	26233	26506	29	40	1.9
CCZ-south	Rodney Place	O	26331	26504	36	6	6.5
CCZ-south	Walworth Road	O	26652	27042	638	629	0.4
CCZ-south	Kennington Park Road	O	27427	26337	585	883	11.0
CCZ-south	Kennington Road	O	28143	28381	583	559	1.0
CCZ-south	Harleyford Road	O	28135	28329	589	584	0.2
CCZ-south	South Lambeth Road	O	28488	28536	507	649	5.9
CCZ-south	Wandsworth Road	O	28309	29187	502	483	0.9
CCZ-south	Nine Elms Lane	O	28130	28318	730	735	0.2

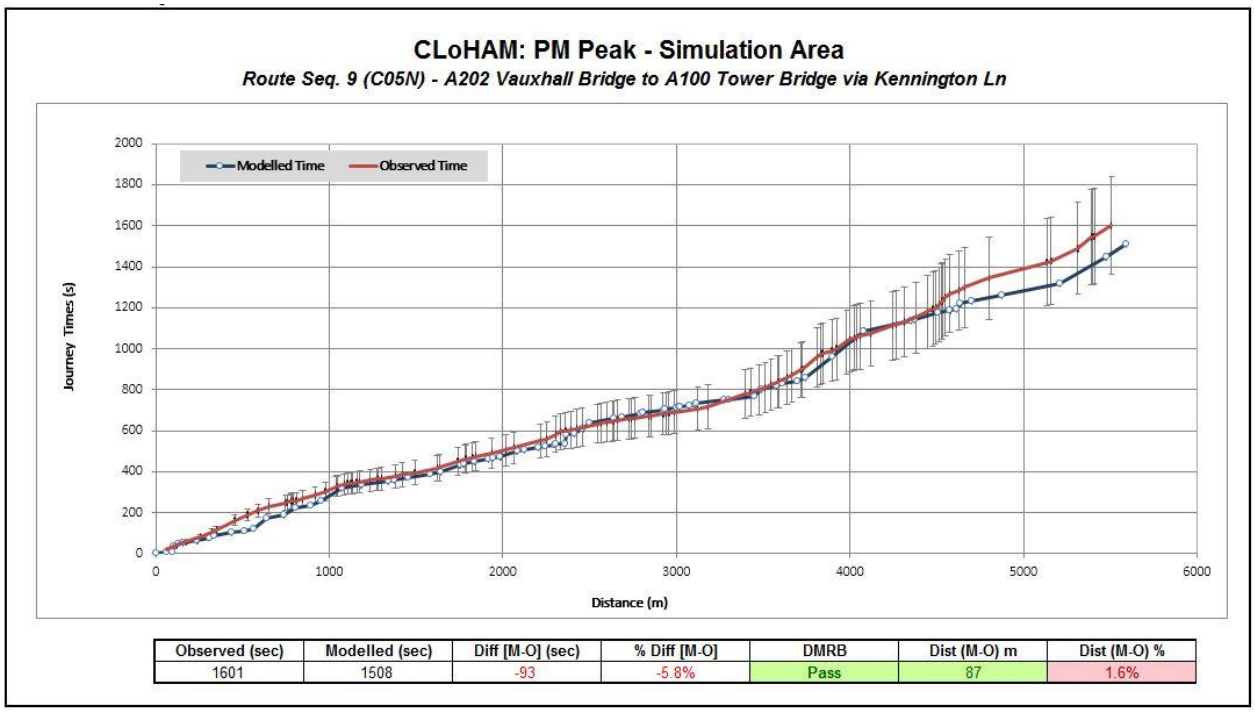
Source: Dashboard\ME2\Dashboard_v3.69.4_CLoHAM_R003_MEv6d.xlsm

Figure 30: Canada Water base model GEH

Source: Ordnance Survey data © Crown copyright and database right 2016

H. CLoHAM model journey times

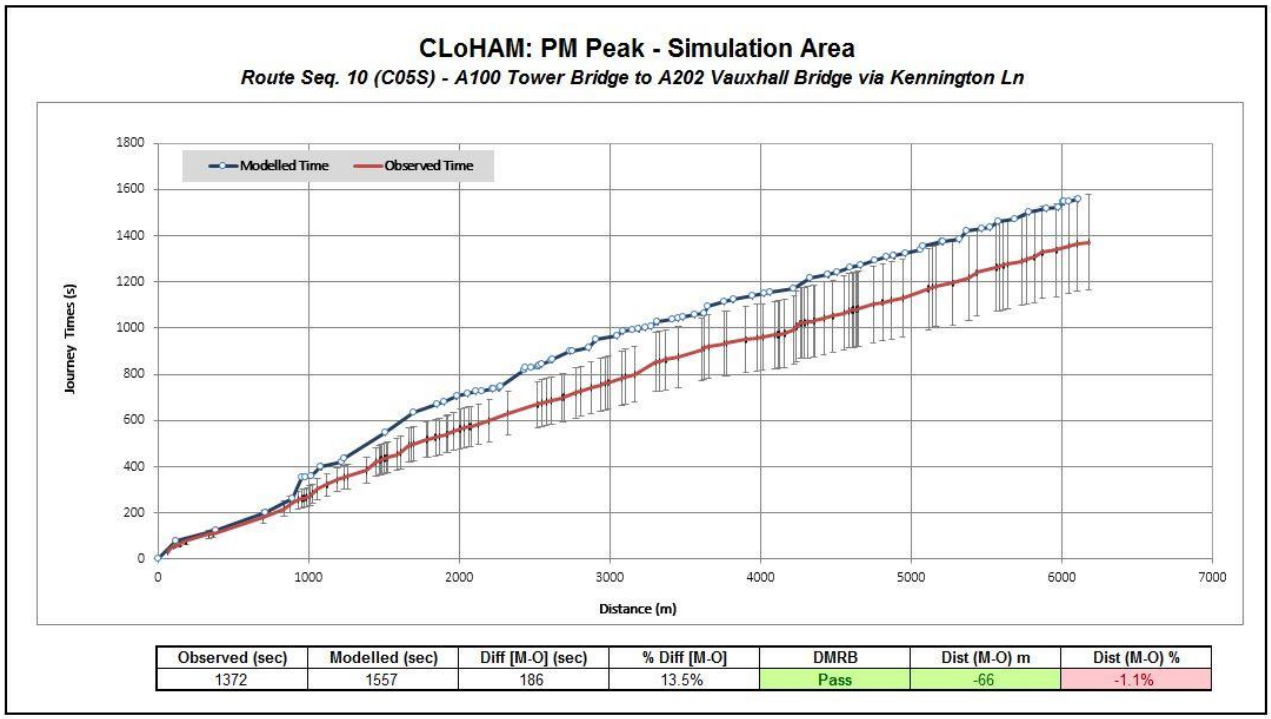
Figure 31: R009



Observed (sec)	Modelled (sec)	Diff [M-O] (sec)	% Diff [M-O]	DMRB	Dist (M-O) m	Dist (M-O) %
1601	1508	-93	-5.8%	Pass	87	1.6%

Source: HAM_JTAT_v3.41.1_CLoHAM_R003_AsReceivedFromTfL.xlsm

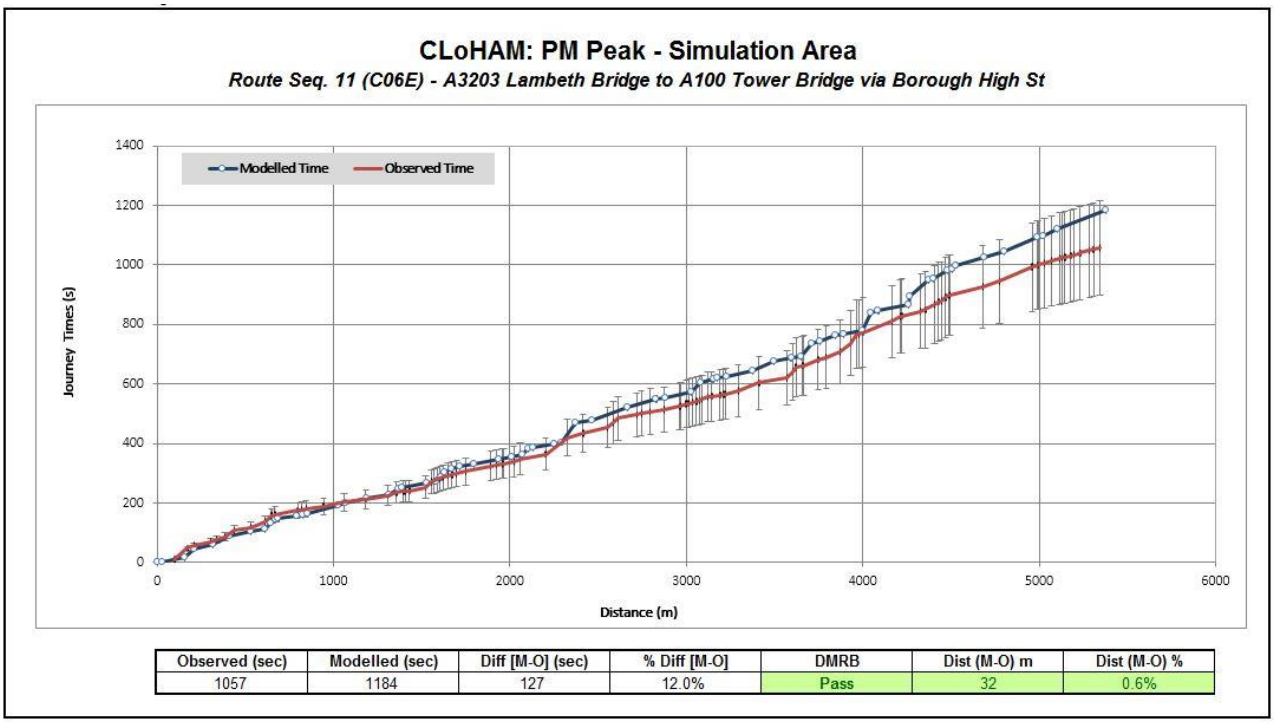
Figure 32: R010



Observed (sec)	Modelled (sec)	Diff [M-O] (sec)	% Diff [M-O]	DMRB	Dist (M-O) m	Dist (M-O) %
1372	1557	186	13.5%	Pass	-66	-1.1%

Source: HAM_JTAT_v3.41.1_CLoHAM_R003_AsReceivedFromTfL.xlsm

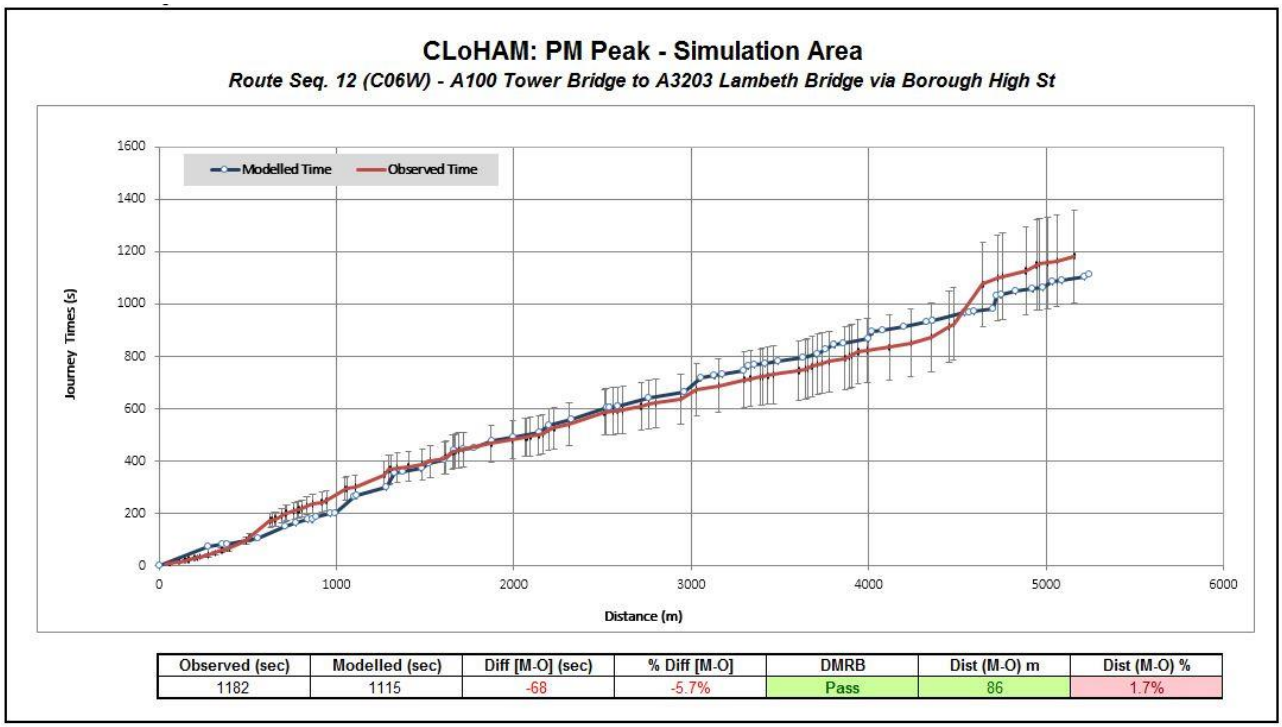
Figure 33: R011



Observed (sec)	Modelled (sec)	Diff [M-O] (sec)	% Diff [M-O]	DMRB	Dist (M-O) m	Dist (M-O) %
1057	1184	127	12.0%	Pass	32	0.6%

Source: HAM_JTAT_v3.41.1_CLoHAM_R003_AsReceivedFromTfL.xlsm

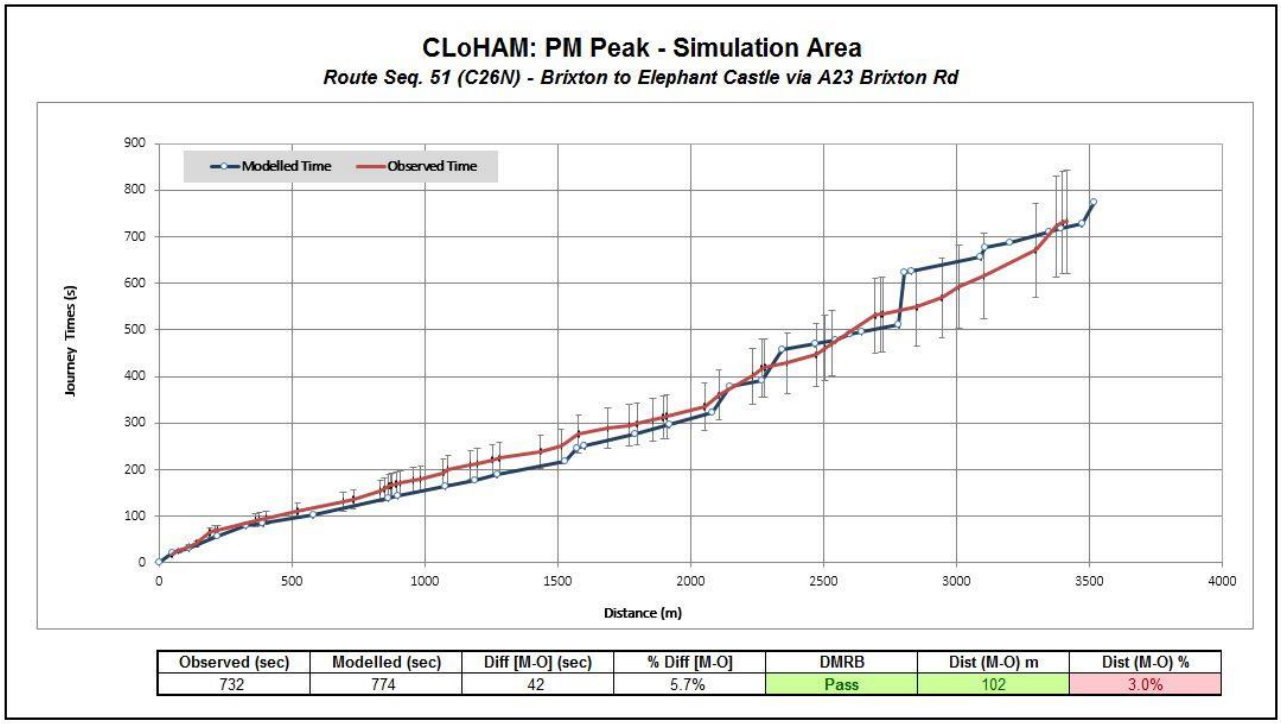
Figure 34: R012



Observed (sec)	Modelled (sec)	Diff [M-O] (sec)	% Diff [M-O]	DMRB	Dist (M-O) m	Dist (M-O) %
1182	1115	-68	-5.7%	Pass	86	1.7%

Source: HAM_JTAT_v3.41.1_CLoHAM_R003_AsReceivedFromTfL.xlsm

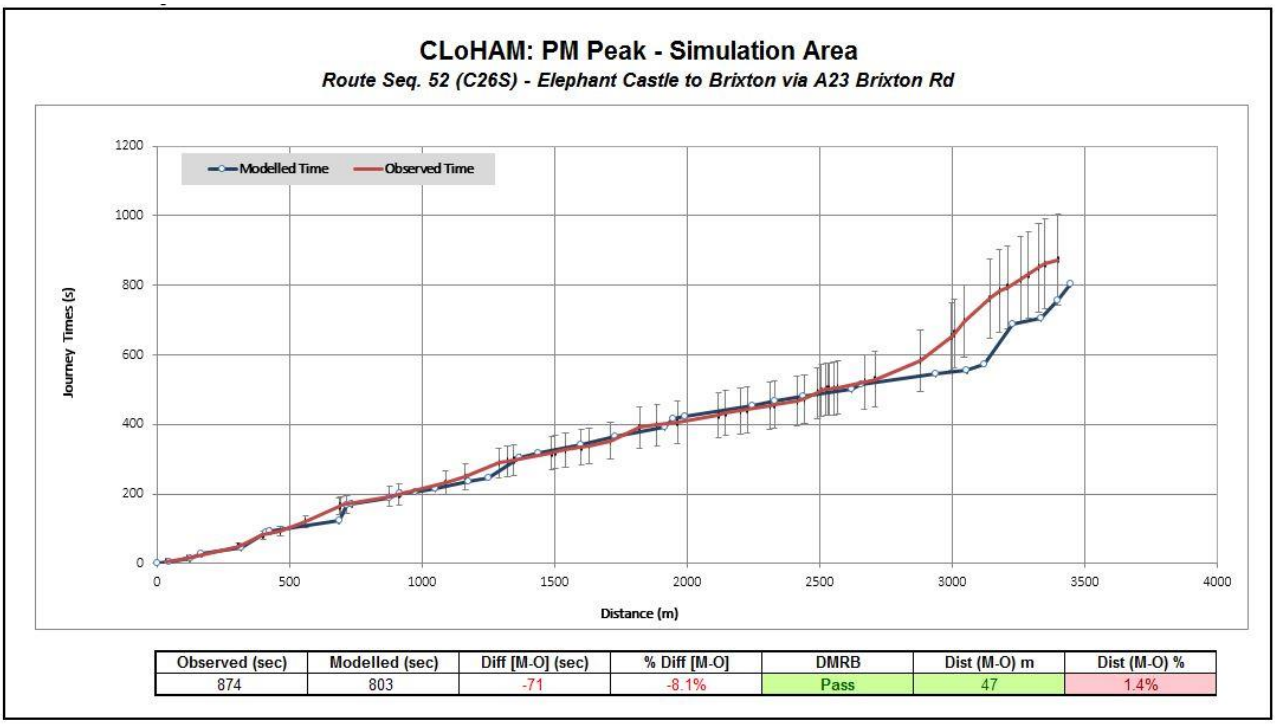
Figure 35: R051



Observed (sec)	Modelled (sec)	Diff [M-O] (sec)	% Diff [M-O]	DMRB	Dist (M-O) m	Dist (M-O) %
732	774	42	5.7%	Pass	102	3.0%

Source: HAM_JTAT_v3.41.1_CLoHAM_R003_AsReceivedFromTfL.xlsm

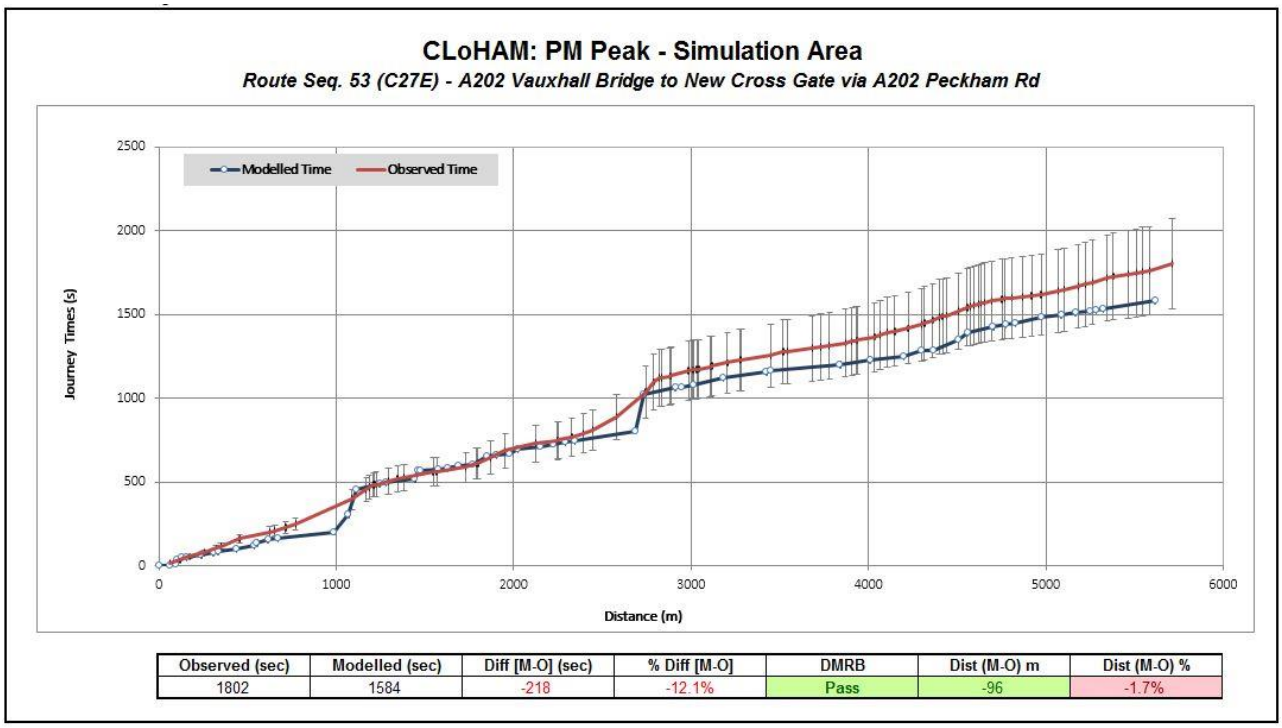
Figure 36: R052



Observed (sec)	Modelled (sec)	Diff [M-O] (sec)	% Diff [M-O]	DMRB	Dist (M-O) m	Dist (M-O) %
874	803	-71	-8.1%	Pass	47	1.4%

Source: HAM_JTAT_v3.41.1_CLoHAM_R003_AsReceivedFromTfL.xlsm

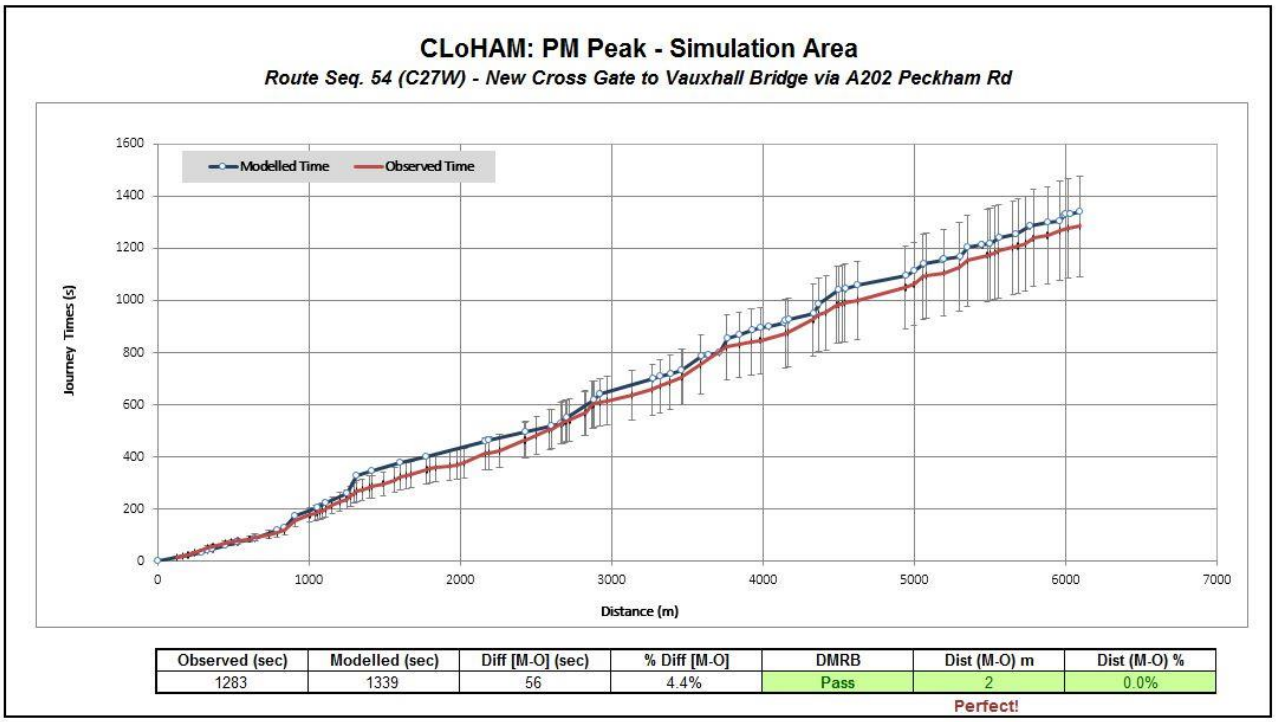
Figure 37: R053



Observed (sec)	Modelled (sec)	Diff [M-O] (sec)	% Diff [M-O]	DMRB	Dist (M-O) m	Dist (M-O) %
1802	1584	-218	-12.1%	Pass	-96	-1.7%

Source: HAM_JTAT_v3.41.1_CLoHAM_R003_AsReceivedFromTfL.xlsm

Figure 38: R054

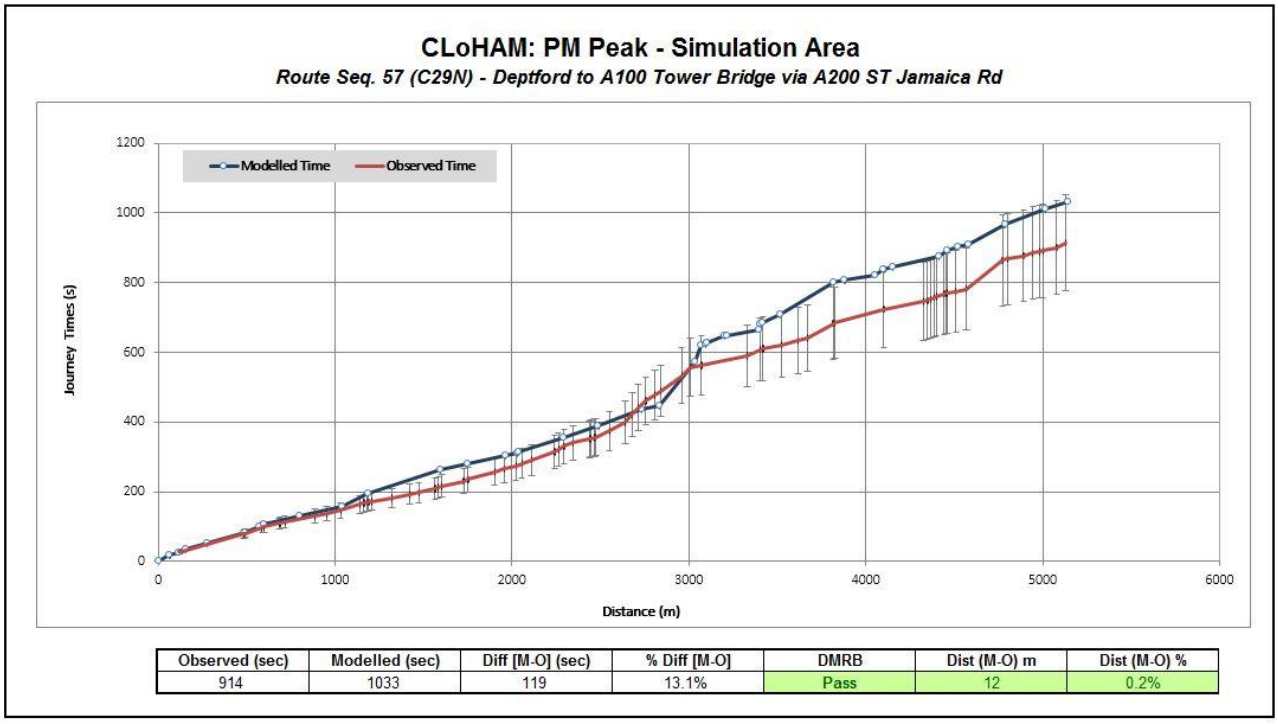


Observed (sec)	Modelled (sec)	Diff [M-O] (sec)	% Diff [M-O]	DMRB	Dist (M-O) m	Dist (M-O) %
1283	1339	56	4.4%	Pass	2	0.0%

Perfect!

Source: HAM_JTAT_v3.41.1_CLoHAM_R003_AsReceivedFromTfL.xlsm

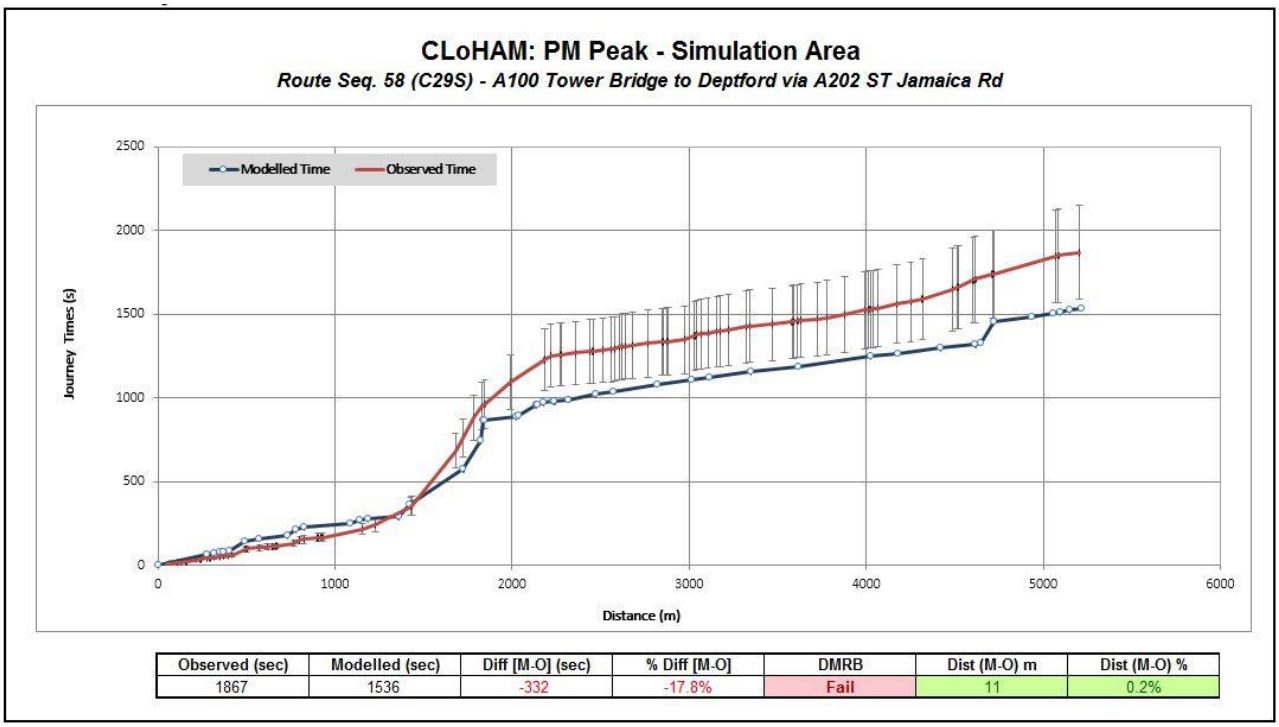
Figure 39: R055



Observed (sec)	Modelled (sec)	Diff [M-O] (sec)	% Diff [M-O]	DMRB	Dist (M-O) m	Dist (M-O) %
914	1033	119	13.1%	Pass	12	0.2%

Source: HAM_JTAT_v3.41.1_CLoHAM_R003_AsReceivedFromTfL.xlsm

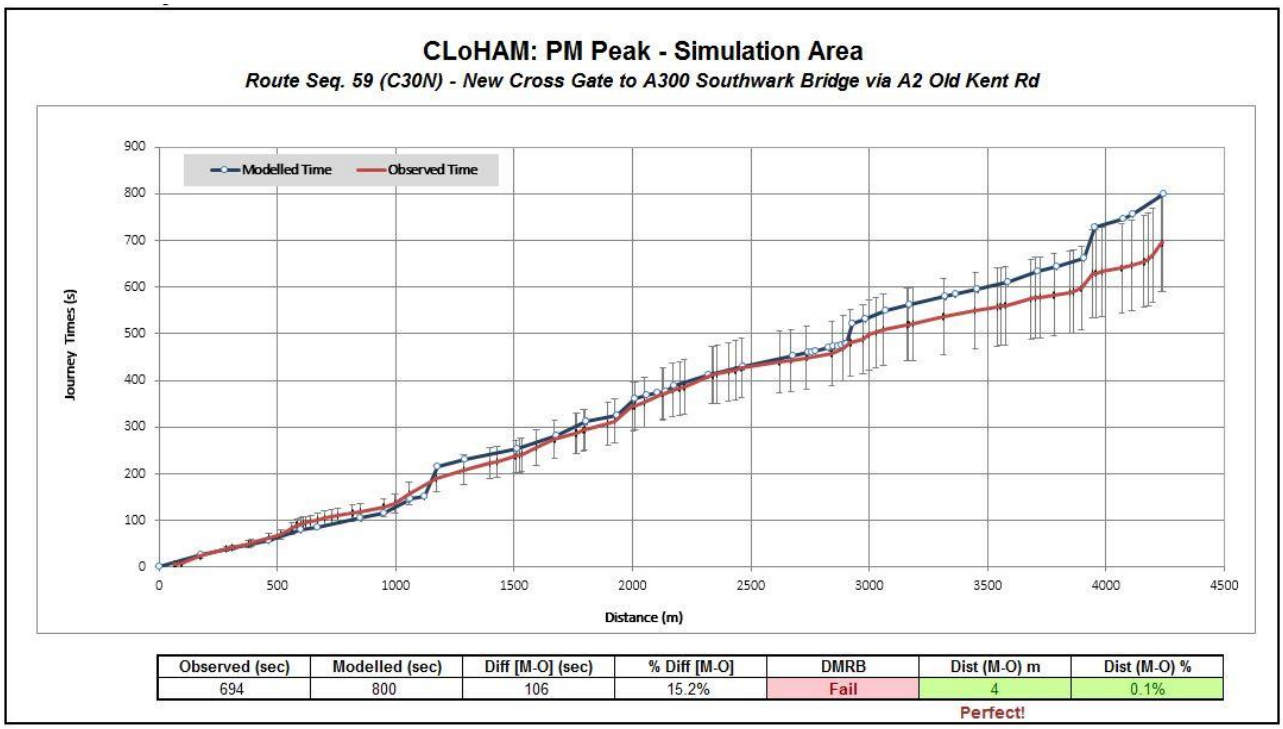
Figure 40: R056



Observed (sec)	Modelled (sec)	Diff [M-O] (sec)	% Diff [M-O]	DMRB	Dist (M-O) m	Dist (M-O) %
1867	1536	-332	-17.8%	Fail	11	0.2%

Source: HAM_JTAT_v3.41.1_CLoHAM_R003_AsReceivedFromTfL.xlsm

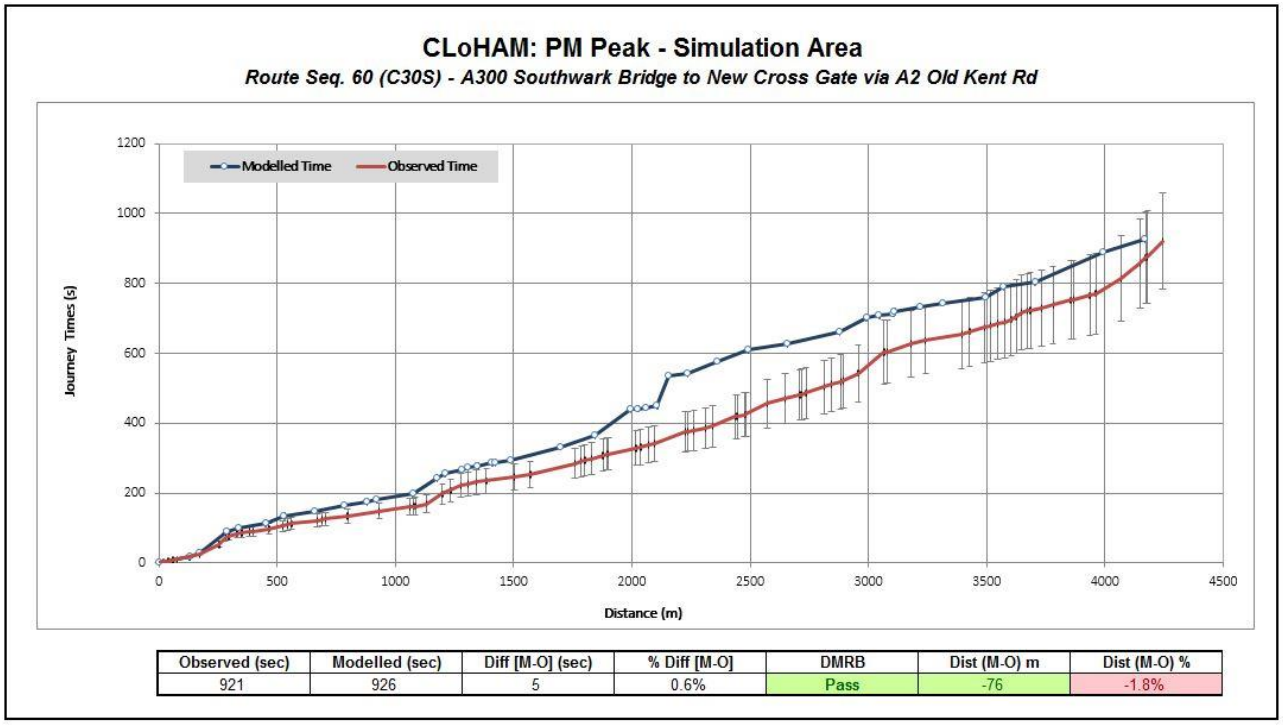
Figure 41: R057



Observed (sec)	Modelled (sec)	Diff [M-O] (sec)	% Diff [M-O]	DMRB	Dist (M-O) m	Dist (M-O) %
694	800	106	15.2%	Fail	4	0.1%
					Perfect!	

Source: HAM_JTAT_v3.41.1_CLoHAM_R003_AsReceivedFromTfL.xlsm

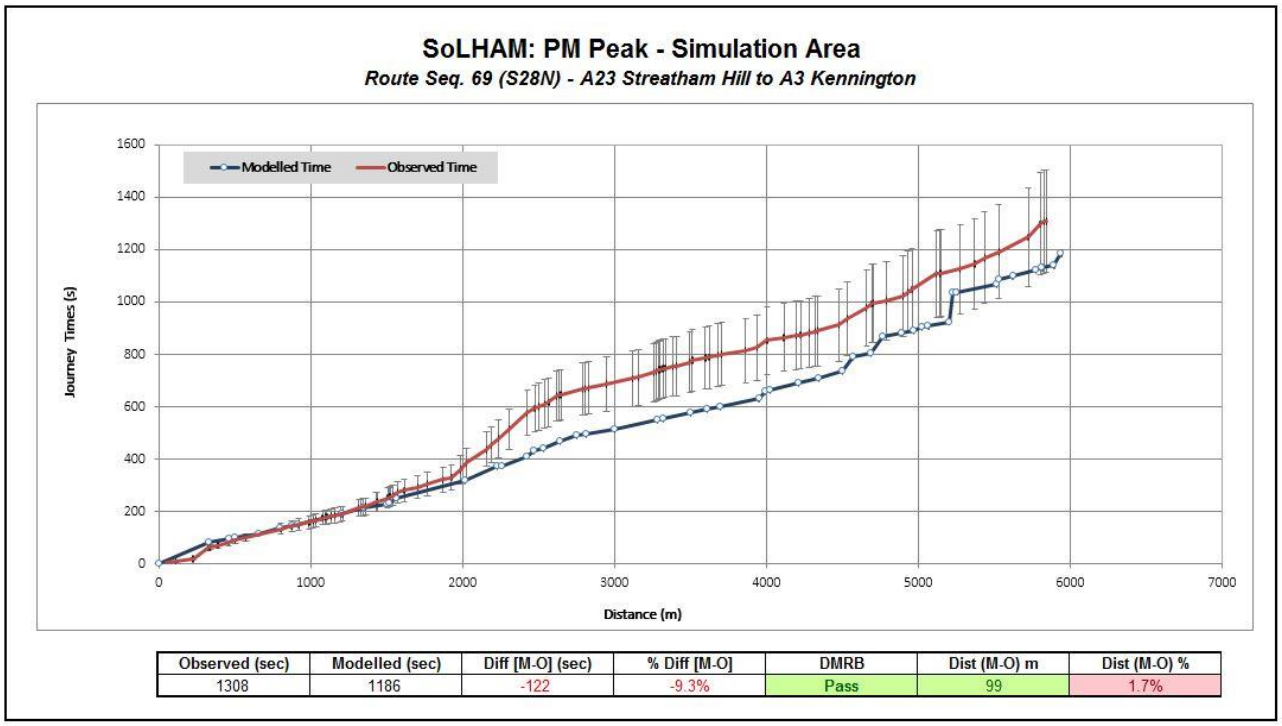
Figure 42: R058



Observed (sec)	Modelled (sec)	Diff [M-O] (sec)	% Diff [M-O]	DMRB	Dist (M-O) m	Dist (M-O) %
921	926	5	0.6%	Pass	-76	-1.8%

Source: HAM_JTAT_v3.41.1_CLoHAM_R003_AsReceivedFromTfL.xlsm

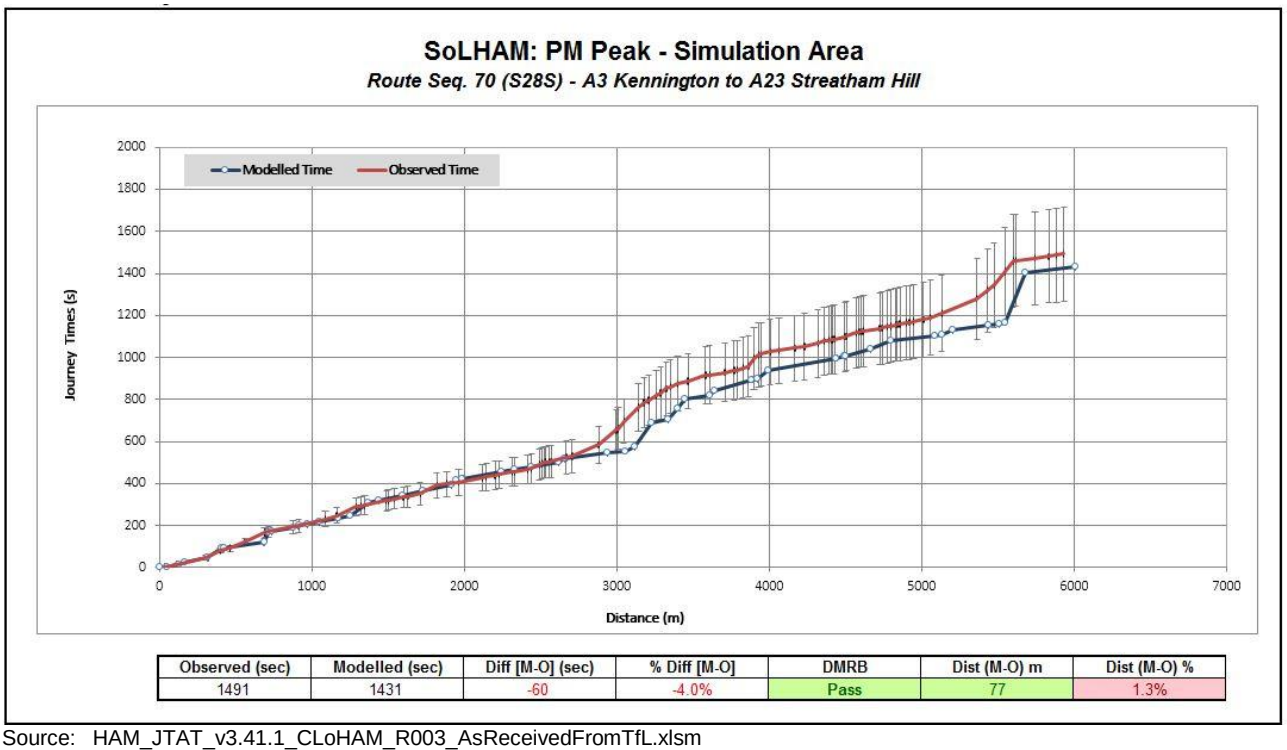
Figure 43: R289



Observed (sec)	Modelled (sec)	Diff [M-O] (sec)	% Diff [M-O]	DMRB	Dist (M-O) m	Dist (M-O) %
1308	1186	-122	-9.3%	Pass	99	1.7%

Source: HAM_JTAT_v3.41.1_CLoHAM_R003_AsReceivedFromTfL.xlsm

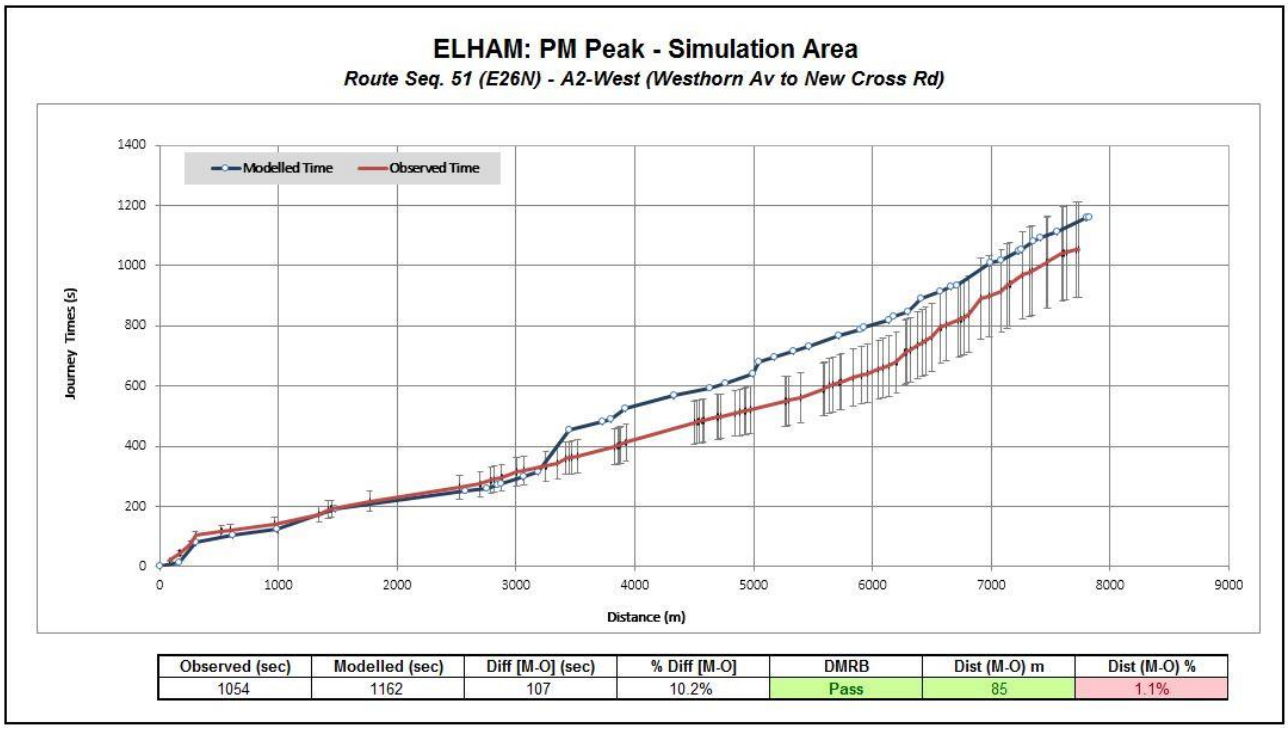
Figure 44: R290



Observed (sec)	Modelled (sec)	Diff [M-O] (sec)	% Diff [M-O]	DMRB	Dist (M-O) m	Dist (M-O) %
1491	1431	-60	-4.0%	Pass	77	1.3%

Source: HAM_JTAT_v3.41.1_CLoHAM_R003_AsReceivedFromTfL.xlsm

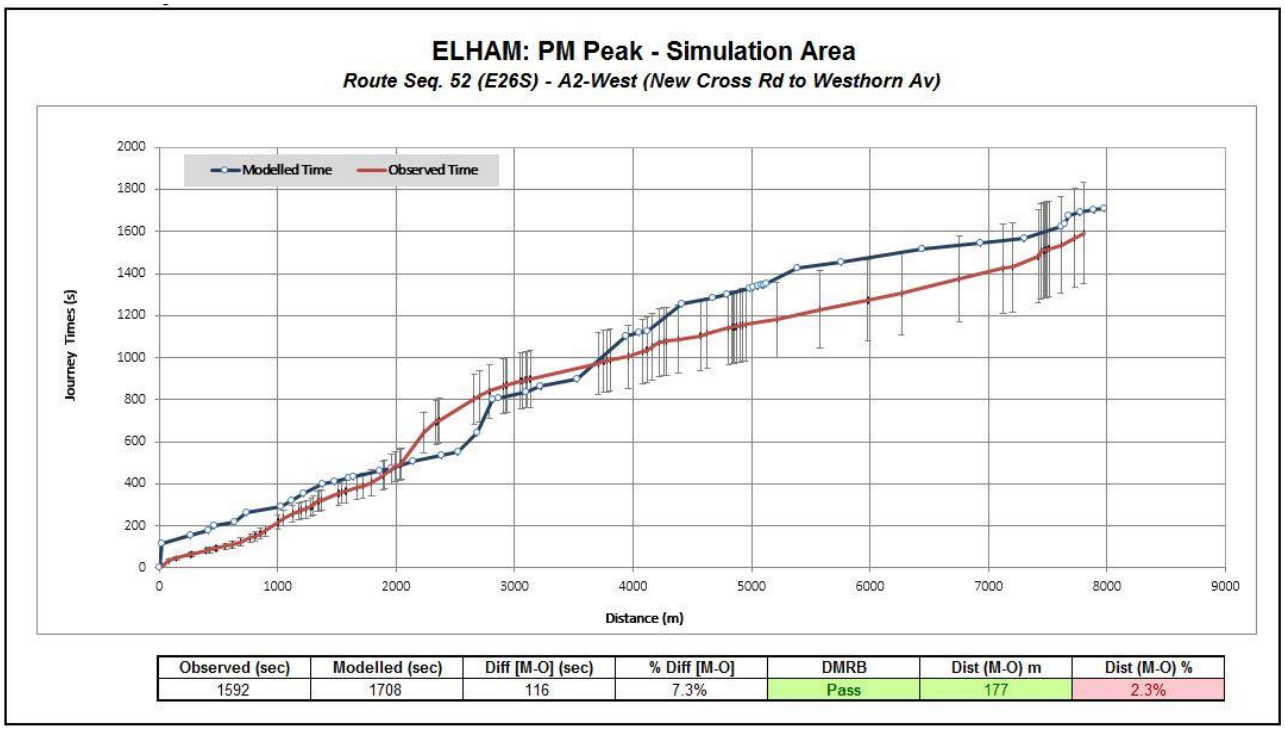
Figure 45: R185



Observed (sec)	Modelled (sec)	Diff [M-O] (sec)	% Diff [M-O]	DMRB	Dist (M-O) m	Dist (M-O) %
1054	1162	107	10.2%	Pass	85	1.1%

Source: HAM_JTAT_v3.41.1_CLoHAM_R003_AsReceivedFromTfL.xlsm

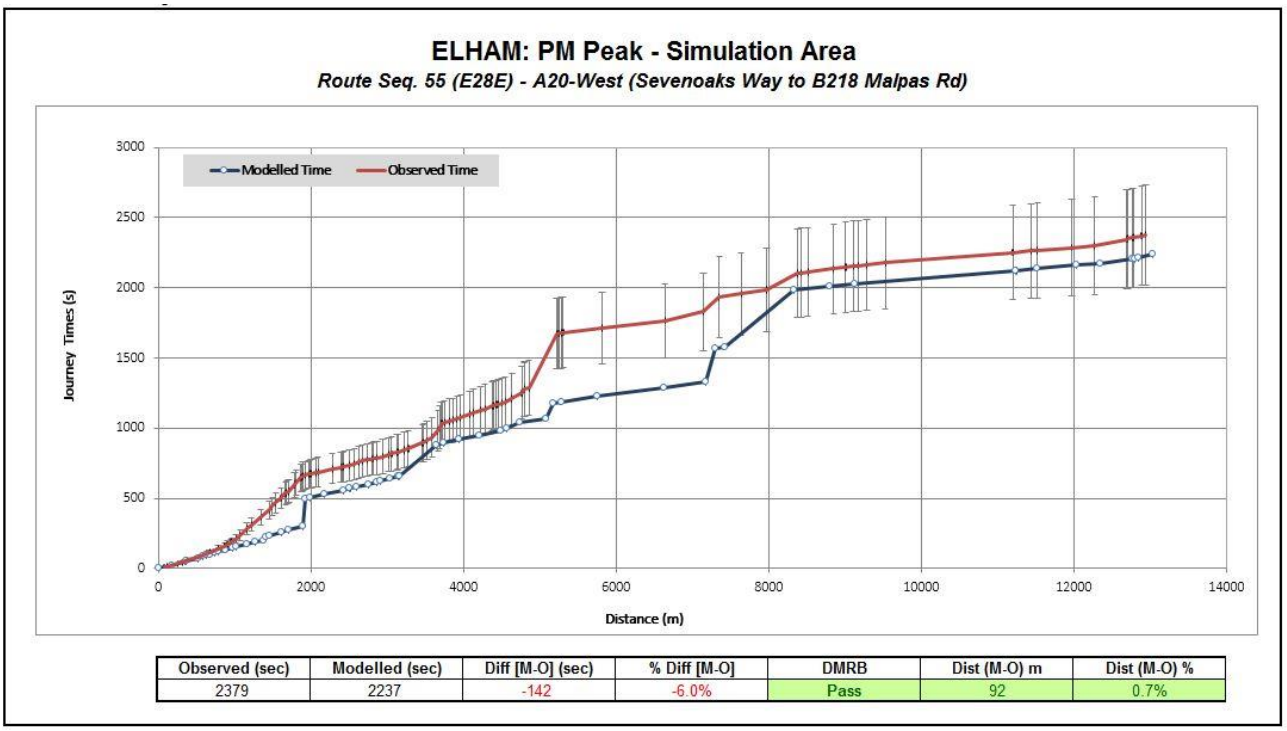
Figure 46: R186



Observed (sec)	Modelled (sec)	Diff [M-O] (sec)	% Diff [M-O]	DMRB	Dist (M-O) m	Dist (M-O) %
1592	1708	116	7.3%	Pass	177	2.3%

Source: HAM_JTAT_v3.41.1_CLoHAM_R003_AsReceivedFromTfL.xlsm

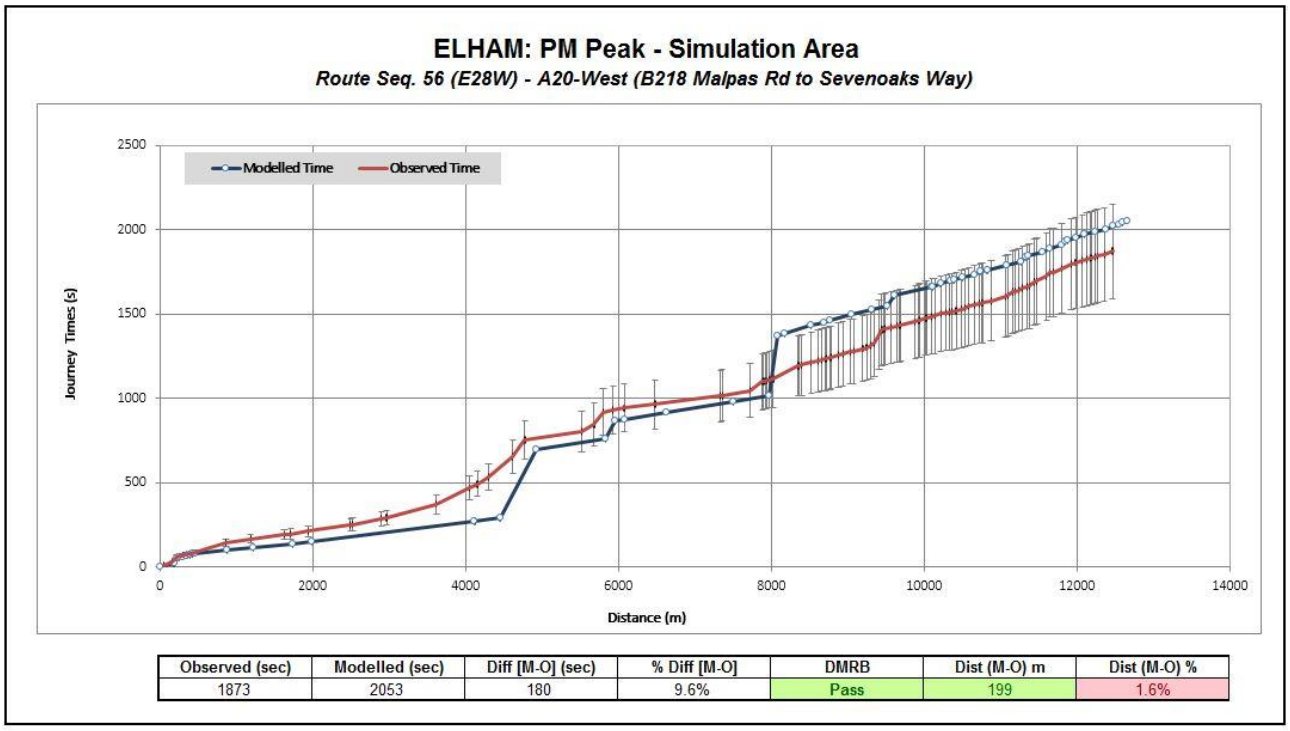
Figure 47: R189



Observed (sec)	Modelled (sec)	Diff [M-O] (sec)	% Diff [M-O]	DMRB	Dist (M-O) m	Dist (M-O) %
2379	2237	-142	-6.0%	Pass	92	0.7%

Source: HAM_JTAT_v3.41.1_CLoHAM_R003_AsReceivedFromTfL.xlsm

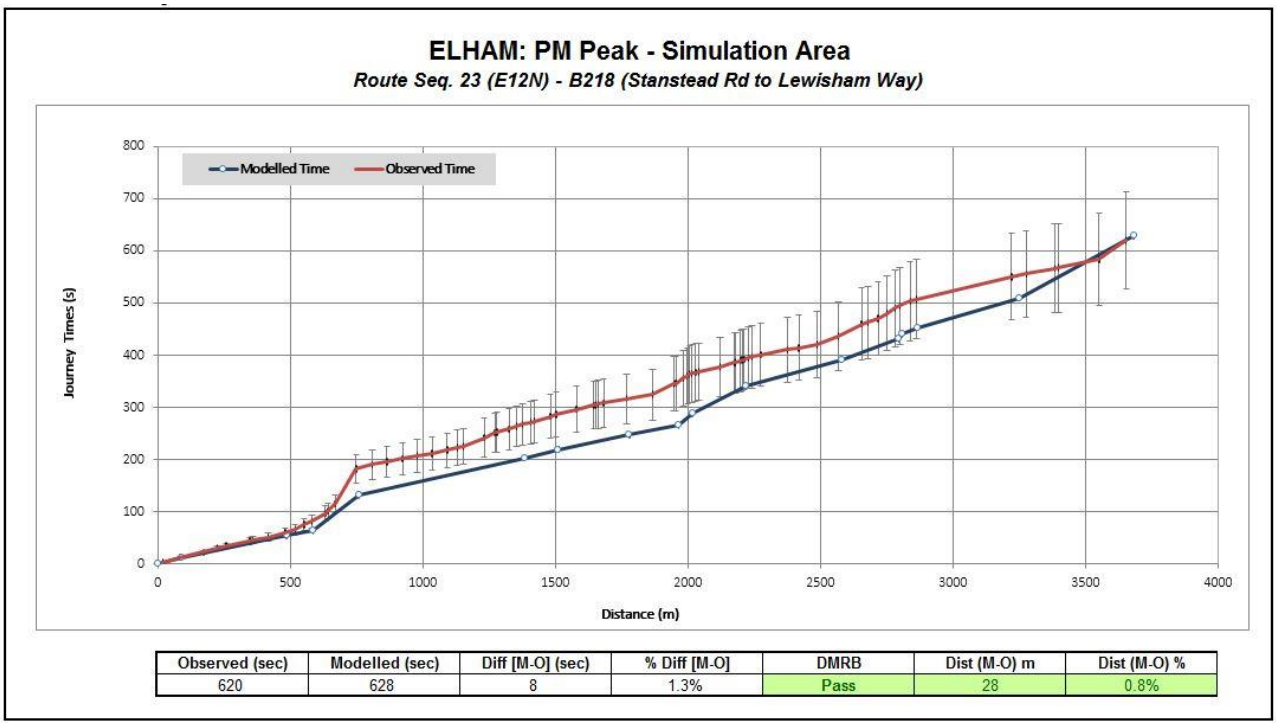
Figure 48: R190



Observed (sec)	Modelled (sec)	Diff [M-O] (sec)	% Diff [M-O]	DMRB	Dist (M-O) m	Dist (M-O) %
1873	2053	180	9.6%	Pass	199	1.6%

Source: HAM_JTAT_v3.41.1_CLoHAM_R003_AsReceivedFromTfL.xlsm

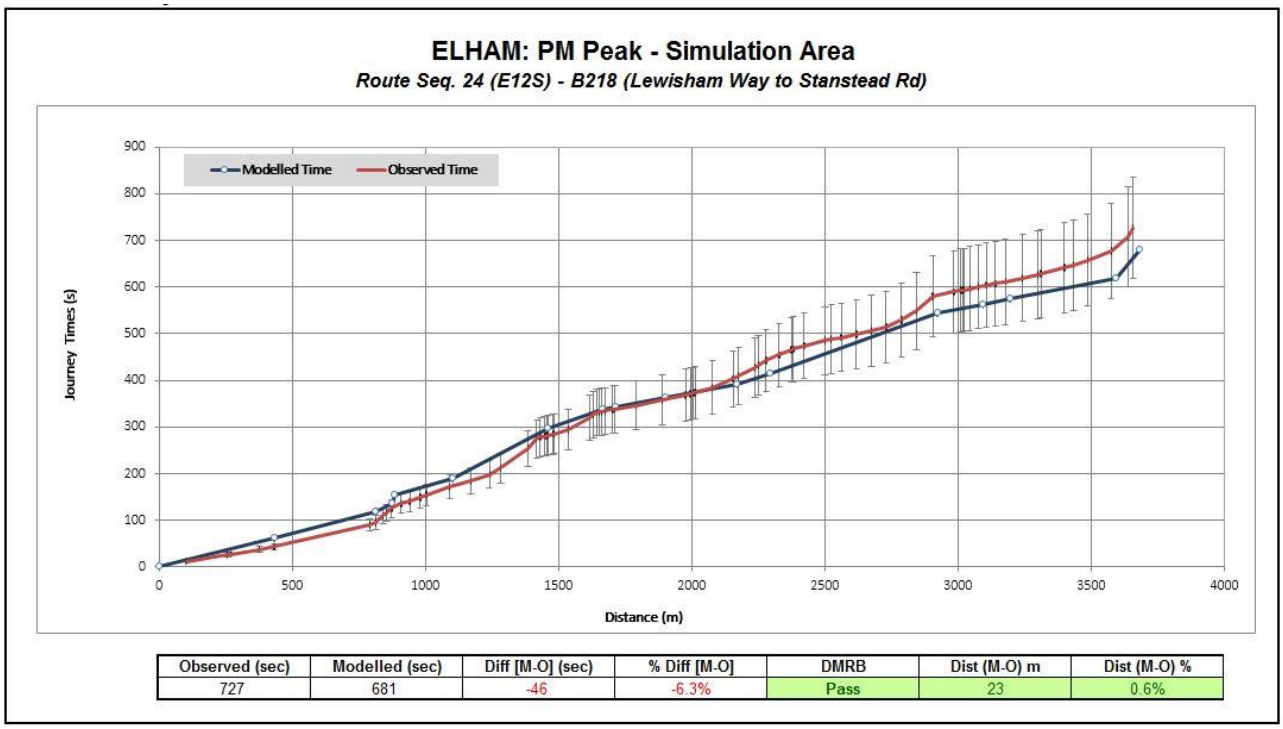
Figure 49: R157



Observed (sec)	Modelled (sec)	Diff [M-O] (sec)	% Diff [M-O]	DMRB	Dist (M-O) m	Dist (M-O) %
620	628	8	1.3%	Pass	28	0.8%

Source: HAM_JTAT_v3.41.1_CLoHAM_R003_AsReceivedFromTfL.xlsm

Figure 50: R158

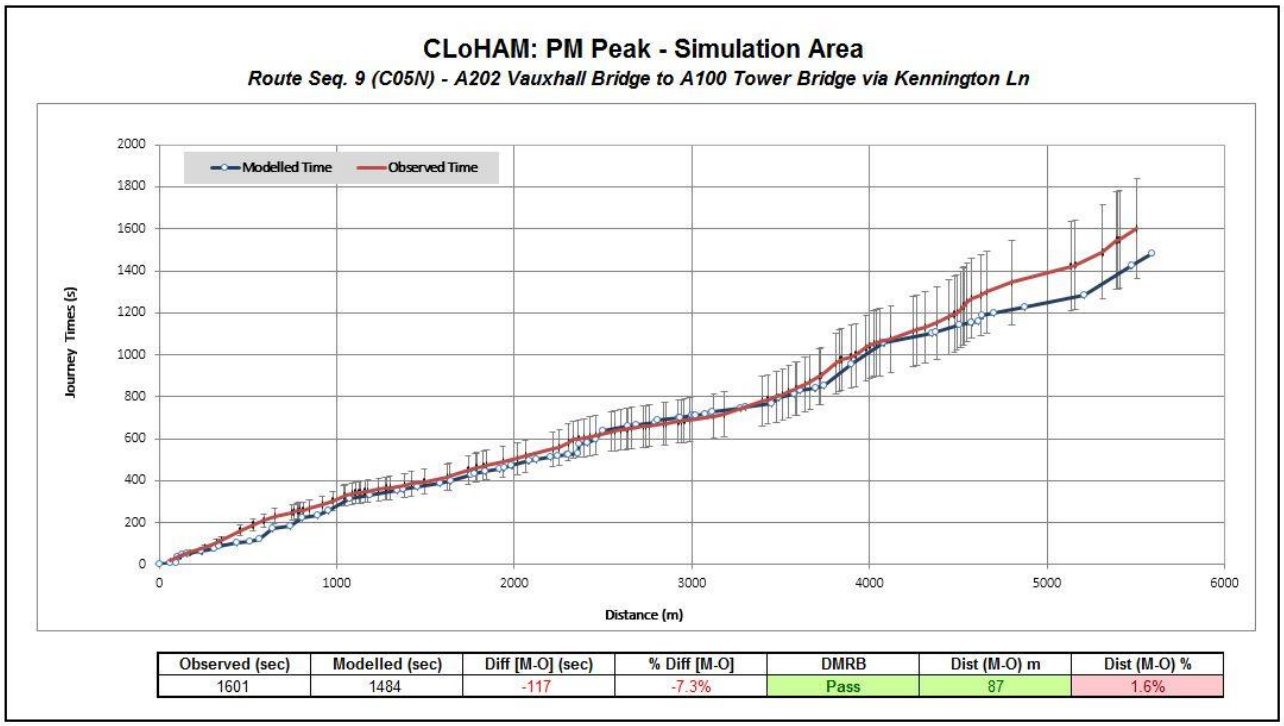


Observed (sec)	Modelled (sec)	Diff [M-O] (sec)	% Diff [M-O]	DMRB	Dist (M-O) m	Dist (M-O) %
727	681	-46	-6.3%	Pass	23	0.6%

Source: HAM_JTAT_v3.41.1_CLoHAM_R003_AsReceivedFromTfL.xlsm

I. Canada Water model journey times

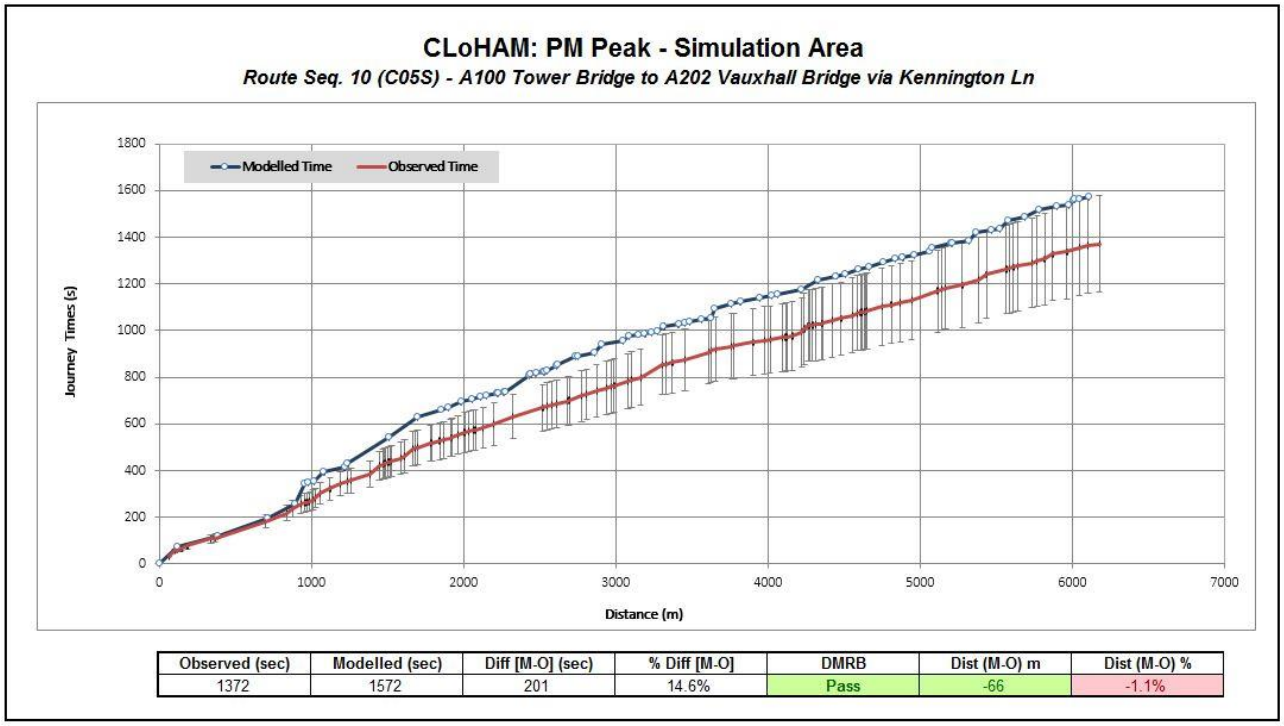
Figure 51: R009



Observed (sec)	Modelled (sec)	Diff [M-O] (sec)	% Diff [M-O]	DMRB	Dist (M-O) m	Dist (M-O) %
1601	1484	-117	-7.3%	Pass	87	1.6%

Source: HAM_JTAT_v3.41.2_CLoHAM_R003_MEv6d.xlsm

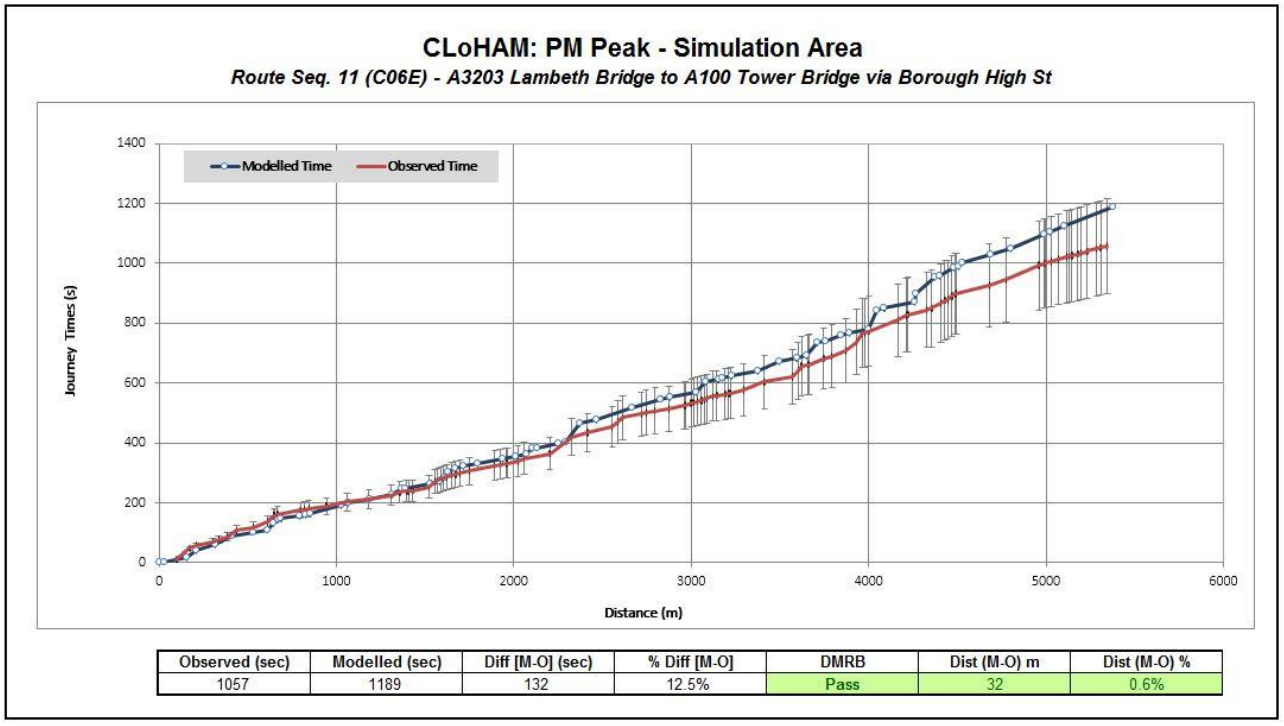
Figure 52: R010



Observed (sec)	Modelled (sec)	Diff [M-O] (sec)	% Diff [M-O]	DMRB	Dist (M-O) m	Dist (M-O) %
1372	1572	201	14.6%	Pass	-66	-1.1%

Source: HAM_JTAT_v3.41.2_CLoHAM_R003_MEv6d.xlsm

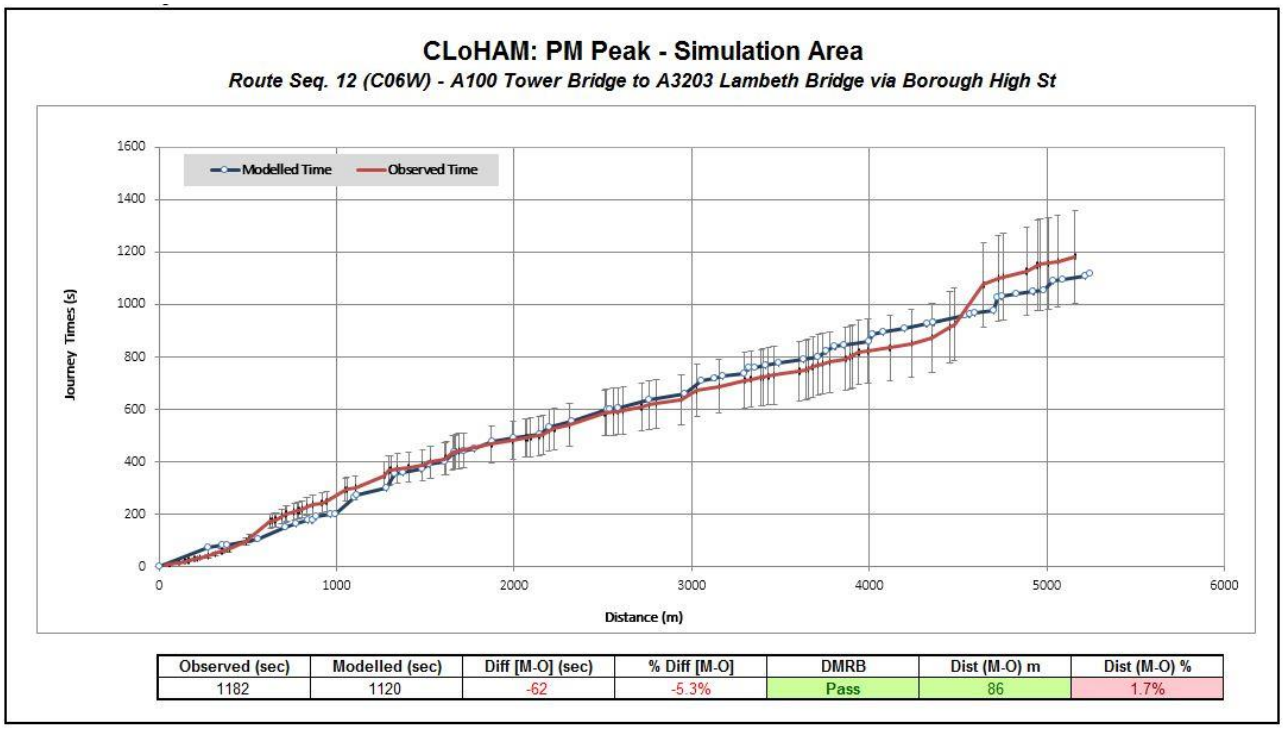
Figure 53: R011



Observed (sec)	Modelled (sec)	Diff [M-O] (sec)	% Diff [M-O]	DMRB	Dist (M-O) m	Dist (M-O) %
1057	1189	132	12.5%	Pass	32	0.6%

Source: HAM_JTAT_v3.41.2_CLoHAM_R003_MEv6d.xlsm

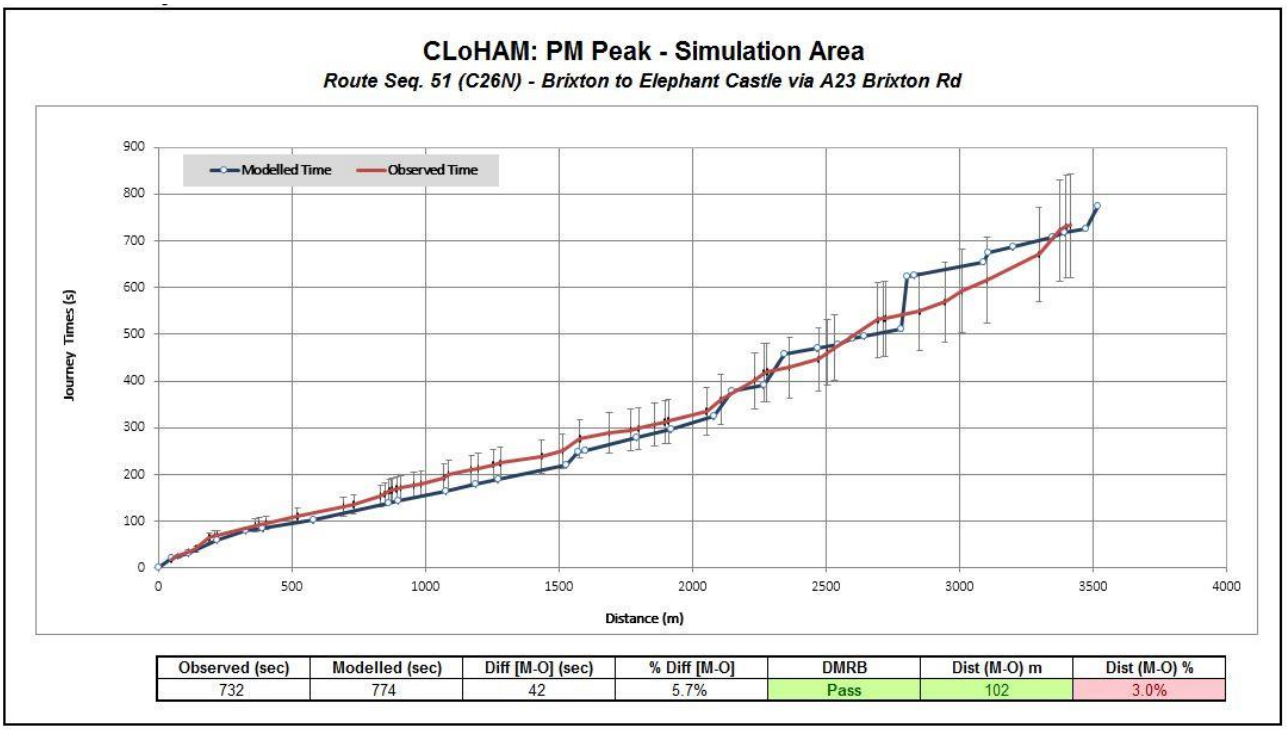
Figure 54: R012



Observed (sec)	Modelled (sec)	Diff [M-O] (sec)	% Diff [M-O]	DMRB	Dist (M-O) m	Dist (M-O) %
1182	1120	-62	-5.3%	Pass	86	1.7%

Source: HAM_JTAT_v3.41.2_CLoHAM_R003_MEv6d.xlsm

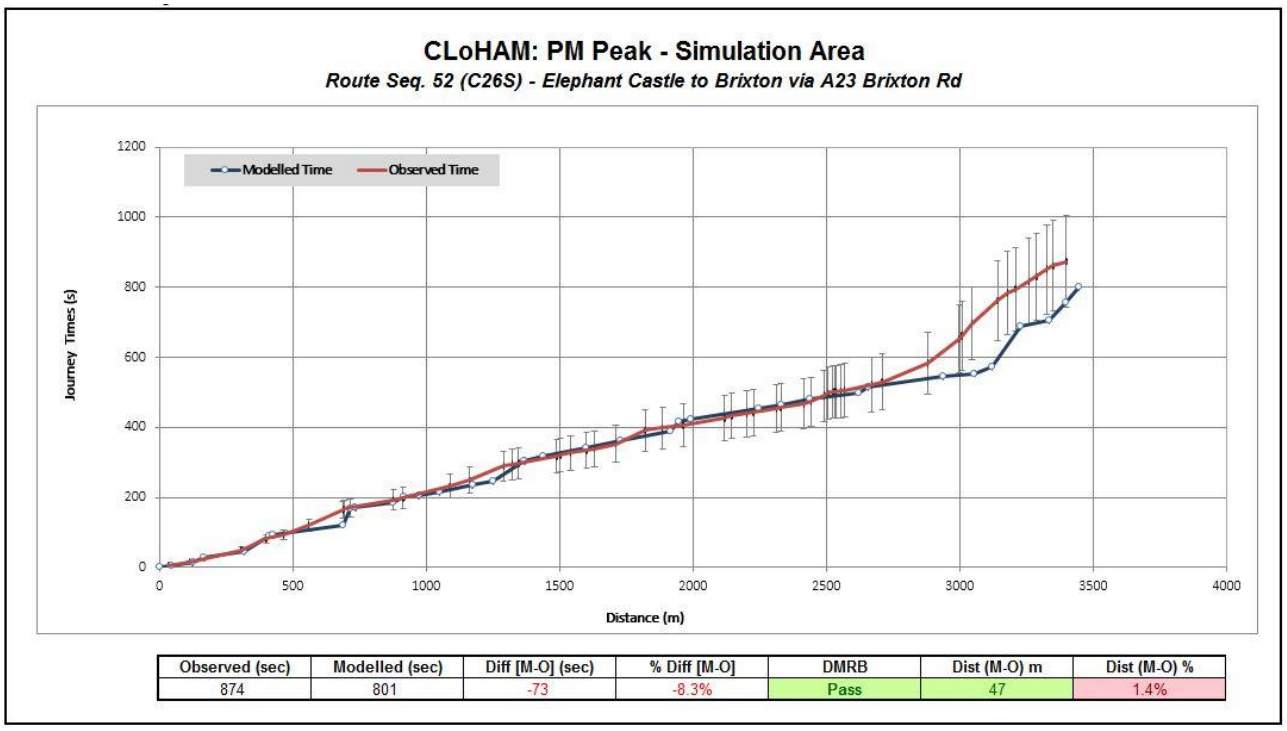
Figure 55: R051



Observed (sec)	Modelled (sec)	Diff [M-O] (sec)	% Diff [M-O]	DMRB	Dist (M-O) m	Dist (M-O) %
732	774	42	5.7%	Pass	102	3.0%

Source: HAM_JTAT_v3.41.2_CLoHAM_R003_MEv6d.xlsm

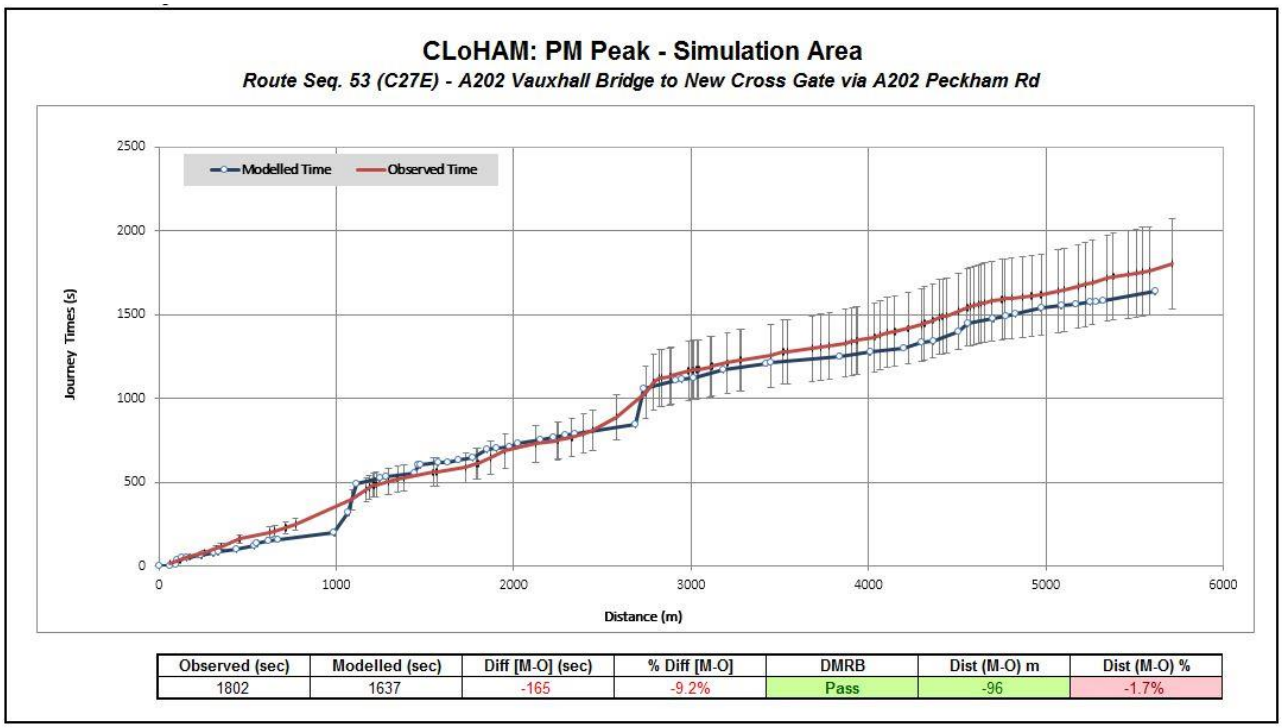
Figure 56: R052



Observed (sec)	Modelled (sec)	Diff [M-O] (sec)	% Diff [M-O]	DMRB	Dist (M-O) m	Dist (M-O) %
874	801	-73	-8.3%	Pass	47	1.4%

Source: HAM_JTAT_v3.41.2_CLoHAM_R003_MEv6d.xlsm

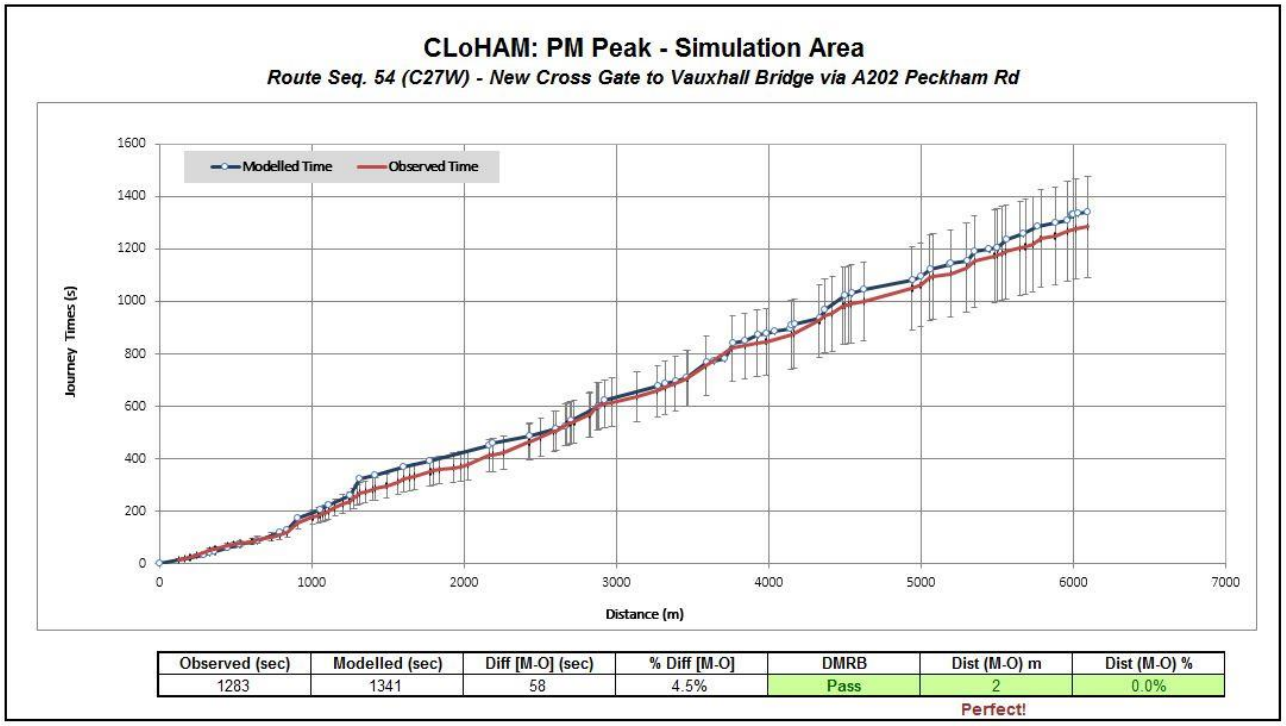
Figure 57: R053



Observed (sec)	Modelled (sec)	Diff [M-O] (sec)	% Diff [M-O]	DMRB	Dist (M-O) m	Dist (M-O) %
1802	1637	-165	-9.2%	Pass	-96	-1.7%

Source: HAM_JTAT_v3.41.2_CLoHAM_R003_MEv6d.xlsm

Figure 58: R054

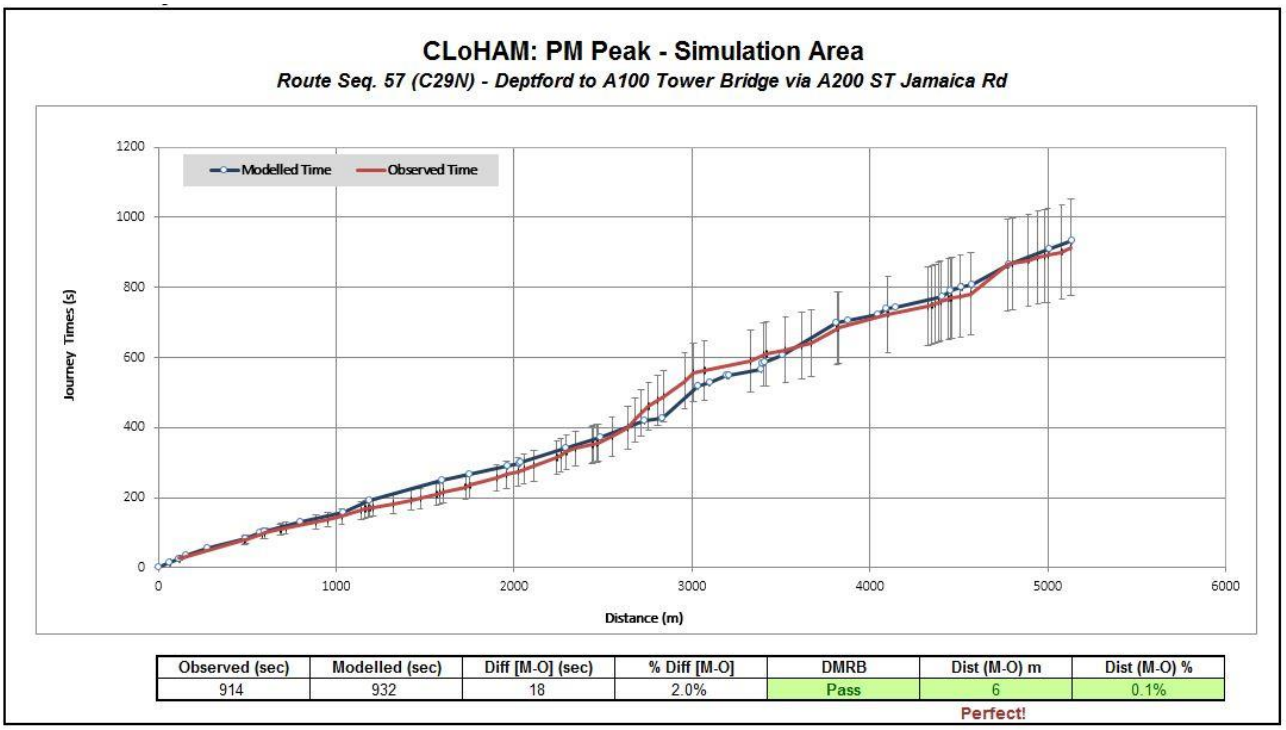


Observed (sec)	Modelled (sec)	Diff [M-O] (sec)	% Diff [M-O]	DMRB	Dist (M-O) m	Dist (M-O) %
1283	1341	58	4.5%	Pass	2	0.0%

Perfect!

Source: HAM_JTAT_v3.41.2_CLoHAM_R003_MEv6d.xlsm

Figure 59: R055

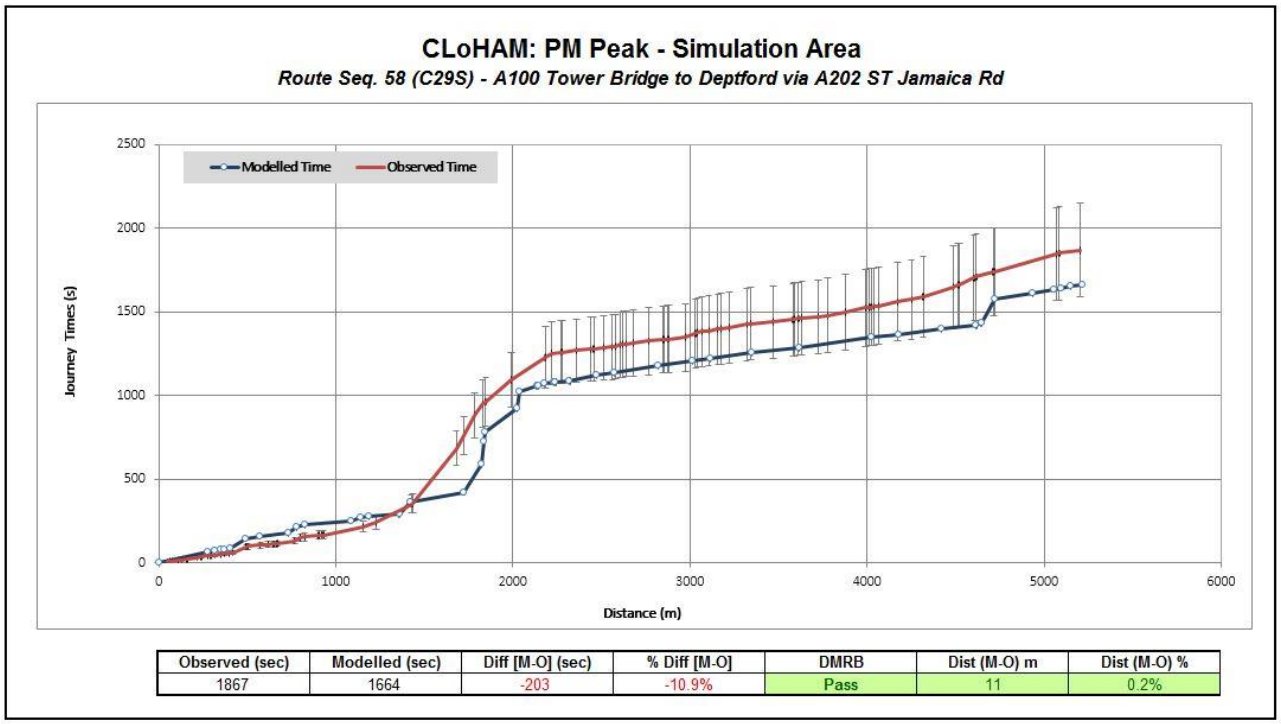


Observed (sec)	Modelled (sec)	Diff [M-O] (sec)	% Diff [M-O]	DMRB	Dist (M-O) m	Dist (M-O) %
914	932	18	2.0%	Pass	6	0.1%

Perfect!

Source: HAM_JTAT_v3.41.2_CLoHAM_R003_MEv6d.xlsm

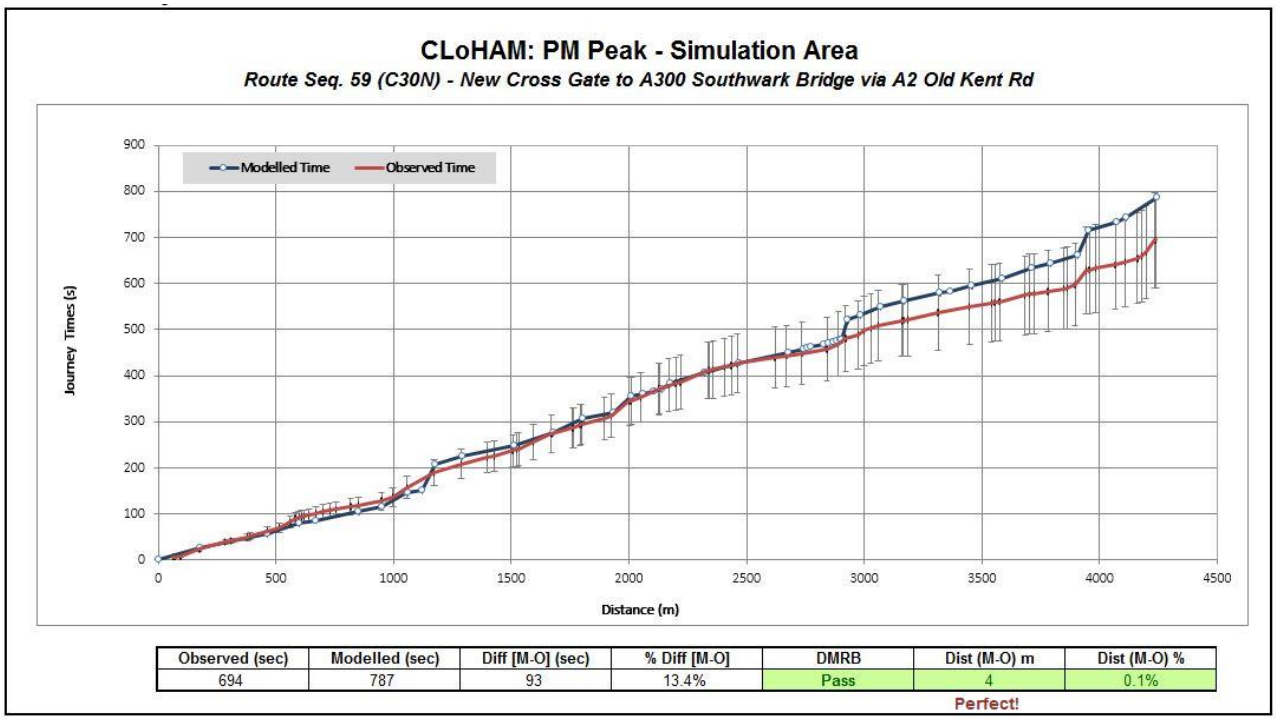
Figure 60: R056



Observed (sec)	Modelled (sec)	Diff [M-O] (sec)	% Diff [M-O]	DMRB	Dist (M-O) m	Dist (M-O) %
1867	1664	-203	-10.9%	Pass	11	0.2%

Source: HAM_JTAT_v3.41.2_CLoHAM_R003_MEv6d.xlsm

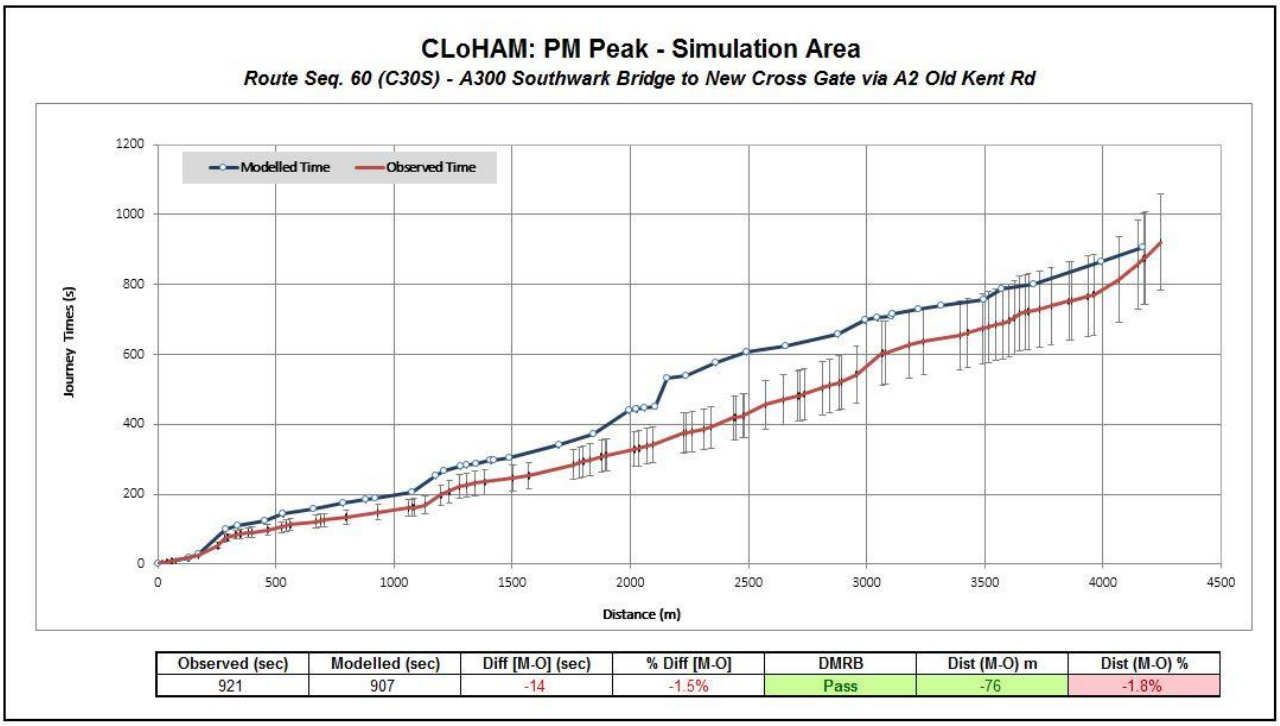
Figure 61: R057



Observed (sec)	Modelled (sec)	Diff [M-O] (sec)	% Diff [M-O]	DMRB	Dist (M-O) m	Dist (M-O) %
694	787	93	13.4%	Pass	4	0.1%
					Perfect!	

Source: HAM_JTAT_v3.41.2_CLoHAM_R003_MEv6d.xlsm

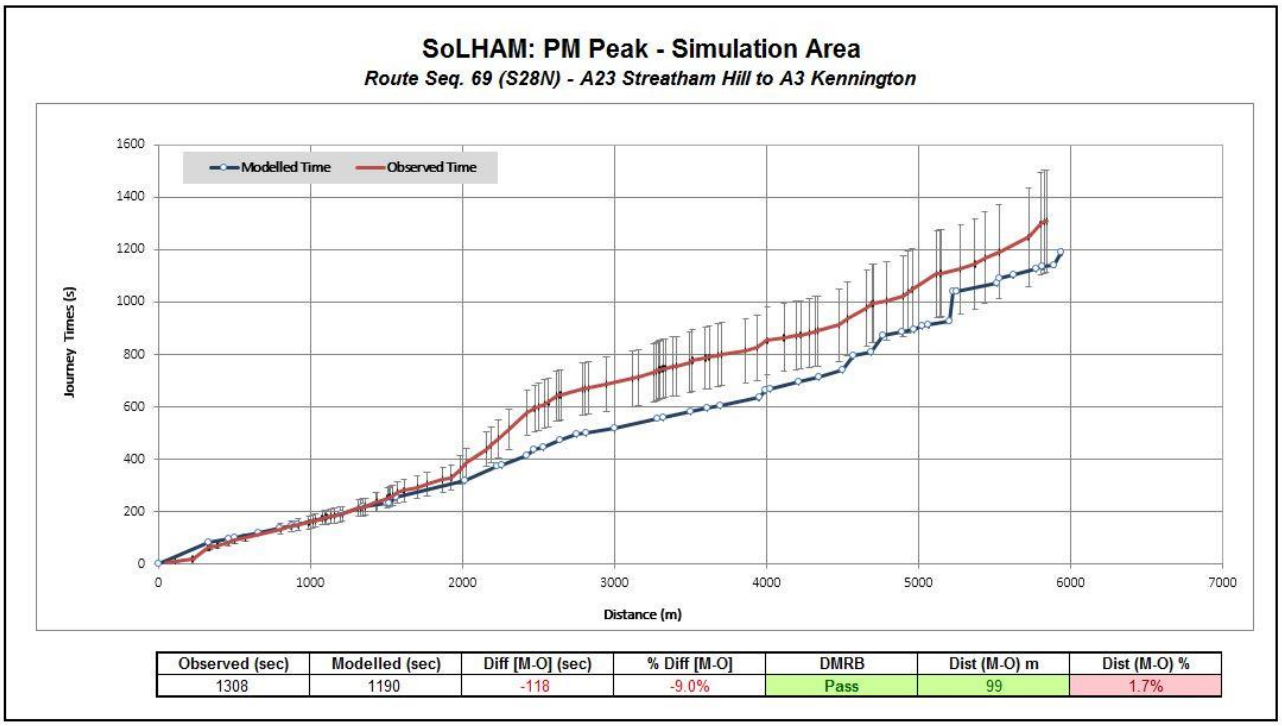
Figure 62: R058



Observed (sec)	Modelled (sec)	Diff [M-O] (sec)	% Diff [M-O]	DMRB	Dist (M-O) m	Dist (M-O) %
921	907	-14	-1.5%	Pass	-76	-1.8%

Source: HAM_JTAT_v3.41.2_CLoHAM_R003_MEv6d.xlsm

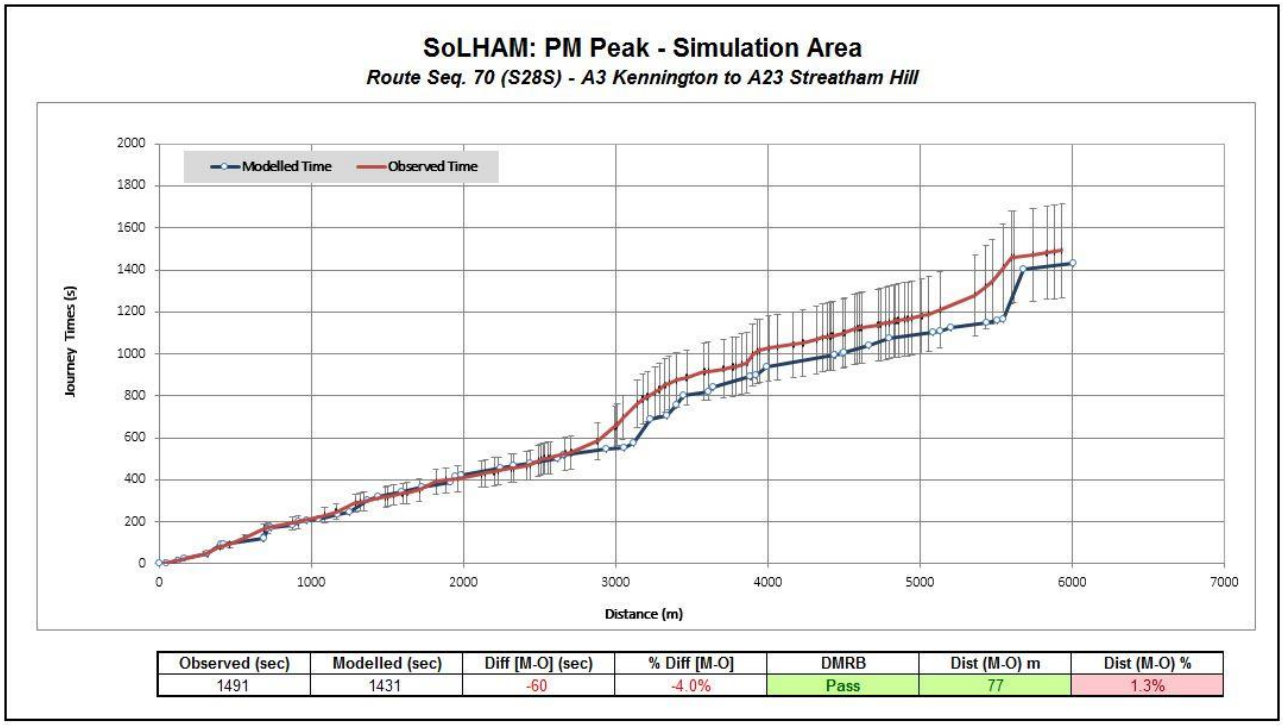
Figure 63: R289



Observed (sec)	Modelled (sec)	Diff [M-O] (sec)	% Diff [M-O]	DMRB	Dist (M-O) m	Dist (M-O) %
1308	1190	-118	-9.0%	Pass	99	1.7%

Source: HAM_JTAT_v3.41.2_CLoHAM_R003_MEv6d.xlsm

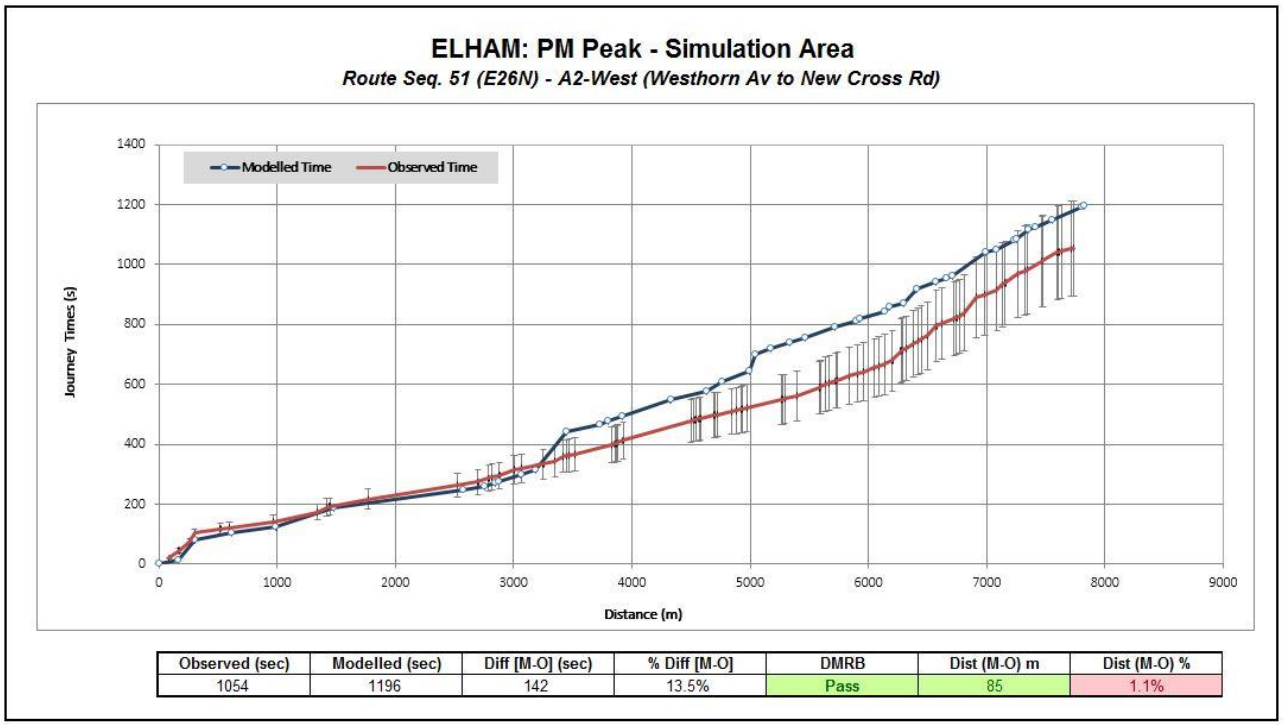
Figure 64: R290



Observed (sec)	Modelled (sec)	Diff [M-O] (sec)	% Diff [M-O]	DMRB	Dist (M-O) m	Dist (M-O) %
1491	1431	-60	-4.0%	Pass	77	1.3%

Source: HAM_JTAT_v3.41.2_CLoHAM_R003_MEv6d.xlsm

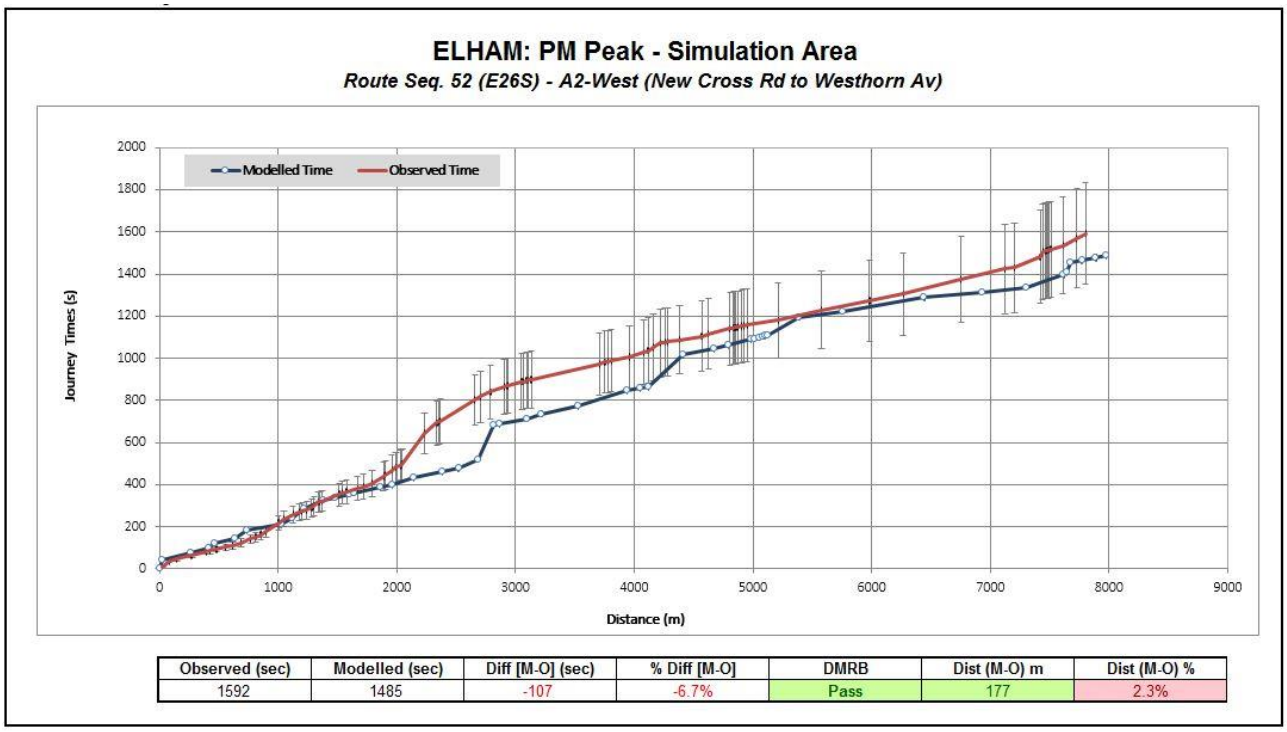
Figure 65: R185



Observed (sec)	Modelled (sec)	Diff [M-O] (sec)	% Diff [M-O]	DMRB	Dist (M-O) m	Dist (M-O) %
1054	1196	142	13.5%	Pass	85	1.1%

Source: HAM_JTAT_v3.41.2_CLoHAM_R003_MEv6d.xlsm

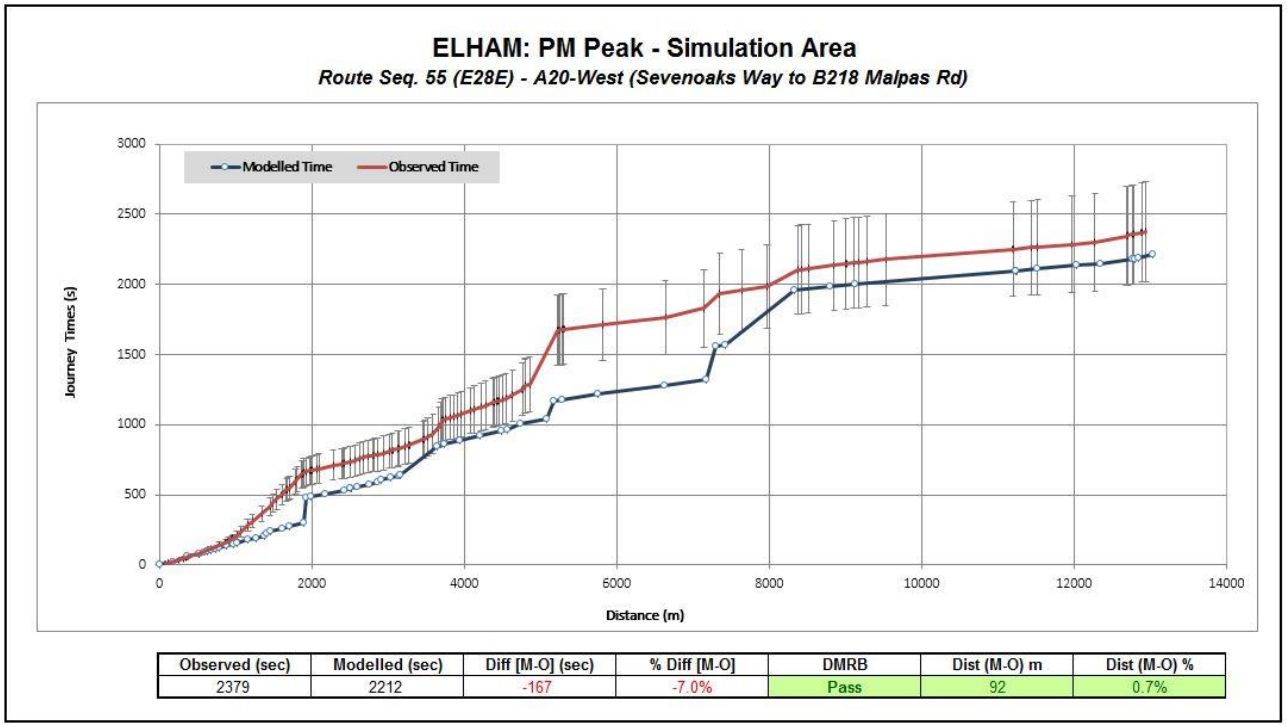
Figure 66: R186



Observed (sec)	Modelled (sec)	Diff [M-O] (sec)	% Diff [M-O]	DMRB	Dist (M-O) m	Dist (M-O) %
1592	1485	-107	-6.7%	Pass	177	2.3%

Source: HAM_JTAT_v3.41.2_CLoHAM_R003_MEv6d.xlsm

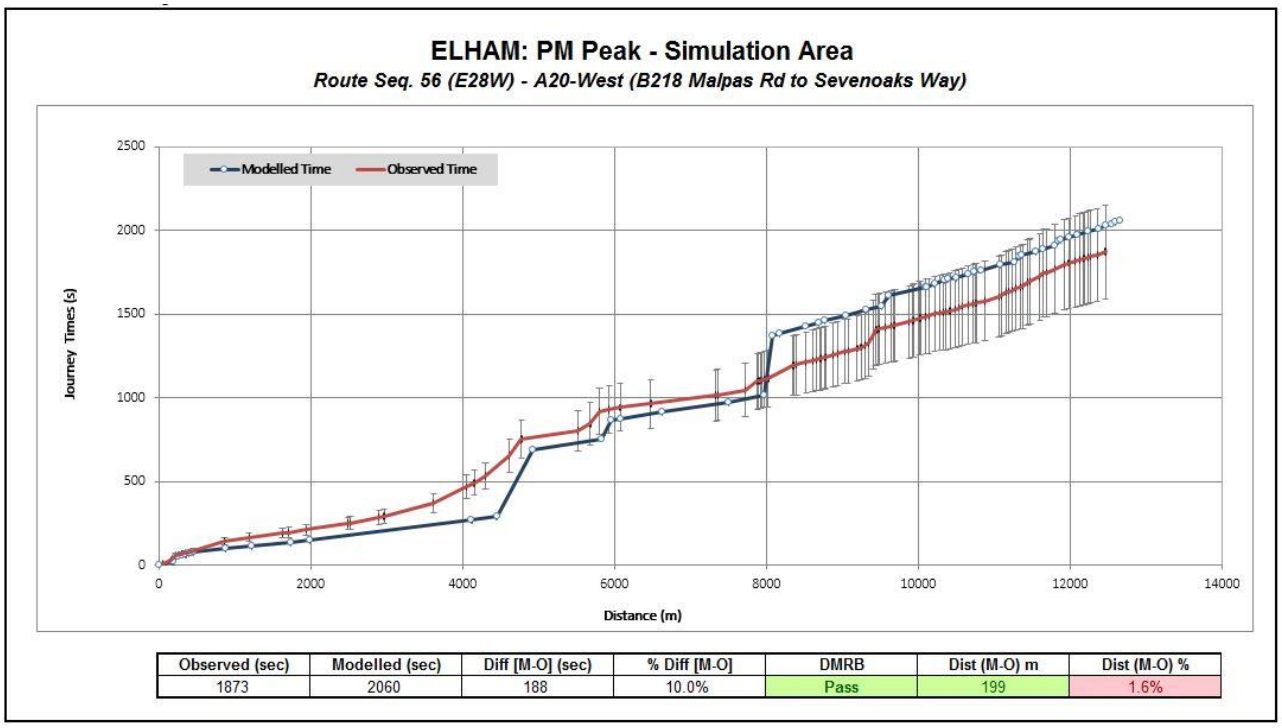
Figure 67: R189



Observed (sec)	Modelled (sec)	Diff [M-O] (sec)	% Diff [M-O]	DMRB	Dist (M-O) m	Dist (M-O) %
2379	2212	-167	-7.0%	Pass	92	0.7%

Source: HAM_JTAT_v3.41.2_CLoHAM_R003_MEv6d.xlsm

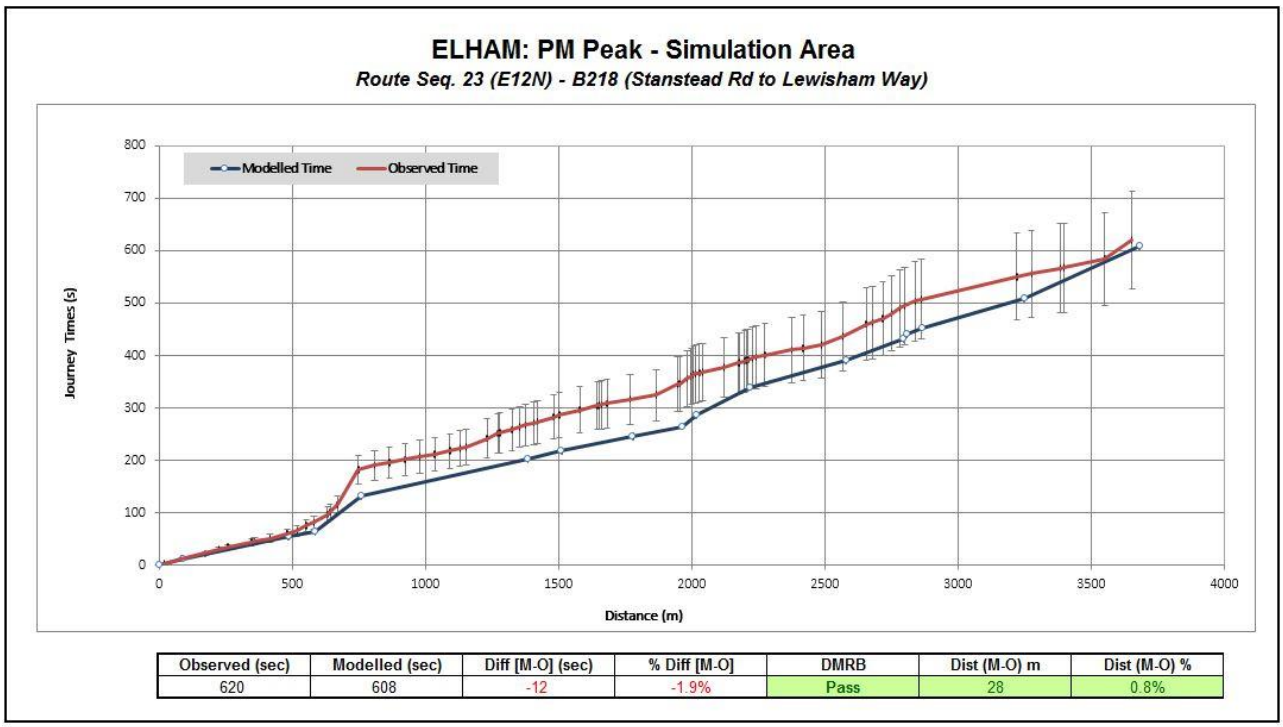
Figure 68: R190



Observed (sec)	Modelled (sec)	Diff [M-O] (sec)	% Diff [M-O]	DMRB	Dist (M-O) m	Dist (M-O) %
1873	2060	188	10.0%	Pass	199	1.6%

Source: HAM_JTAT_v3.41.2_CLoHAM_R003_MEv6d.xlsm

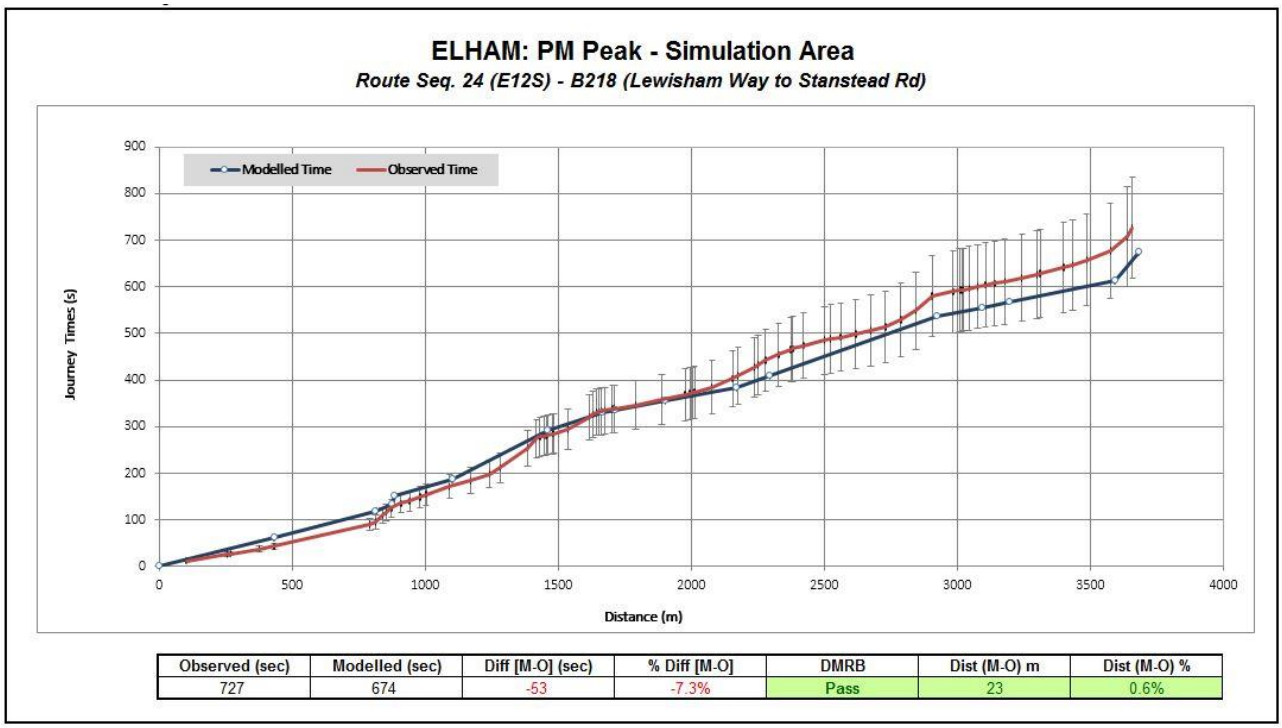
Figure 69: R157



Observed (sec)	Modelled (sec)	Diff [M-O] (sec)	% Diff [M-O]	DMRB	Dist (M-O) m	Dist (M-O) %
620	608	-12	-1.9%	Pass	28	0.8%

Source: HAM_JTAT_v3.41.2_CLoHAM_R003_MEv6d.xlsm

Figure 70: R158



Observed (sec)	Modelled (sec)	Diff [M-O] (sec)	% Diff [M-O]	DMRB	Dist (M-O) m	Dist (M-O) %
727	674	-53	-7.3%	Pass	23	0.6%

Source: HAM_JTAT_v3.41.2_CLoHAM_R003_MEv6d.xlsm