

Review of South Tower Hamlets Restructuring

TfL Surface Transport – Public Transport Service
Planning

May 2019

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1 INTRODUCTION

- 1.1 In September and October 2016 routes 108, 135, 277, D3 and D8 were restructured. This review looks at the outcomes of that restructuring by comparing before and after data.

Background

- 1.2 The 2016 restructuring consisted of the 108/D8 scheme and the 135/277/D3 scheme and arose from the 2014 South Tower Hamlets study. (<http://content.tfl.gov.uk/bus-services-in-south-tower-hamlets.pdf>)

- 1.3 The design of the restructuring sought to achieve the following:

- Address declining demand on the D8 and reduce the extent to which it paralleled the DLR (which the route was originally designed to do) by re-routeing it onto the A12 corridor from the Campbell Road corridor.
- Put larger vehicles on the A12 corridor to meet very peaked demand from Bow school as well as better connect the school to its forecast catchment area as it expanded in size. This was achieved by converting IT to double deck buses. By using double decks, it meant that it could no longer serve Carpenters Road due to a low bridge. The D8 was swapped with the 108 at Stratford High Street to serve Stratford bus station with the 108 now serving Stratford City bus station.
- Provide additional peak hour capacity on the Campbell Road corridor which was forecast to see growth. This was done by replacing the D8 with the higher frequency 108 from the A12 corridor. Also higher capacity single deck buses were used on the 108.
- Provide the Westferry Road corridor – traditionally the busiest point for the routes serving it – with more peak capacity to meet the forecast growth in demand from new development in the Isle of Dogs. This was achieved by swapping the six buses per hour (bph) single deck D3 with the 9 bph double deck 277. This also better matched capacity with demand between Canary Wharf and Leamouth.

- The detail around delivering the swap meant the 135 had to be included within the overall scheme design.
- Improve access to land uses south of Aspen Way by putting buses on Blackwall Way. This was facilitated by innovative highway works undertaken by LB Tower Hamlets.
- Both schemes sought to minimise the number of broken direct trips passengers made while providing new direct travel opportunities e.g. from south of the river into the Queen Elizabeth Olympic Park.

1.4 The original proposal benefitted from consultation feedback. The main issues raised included:

- Concern around leaving Spindrif Avenue unserved by buses.
- Concern around reducing the frequency of the D7 from 9 bph to 7.5 bph.
- Concern around no longer having a direct bus to a particular destination e.g. access to the Royal London Hospital at Whitechapel on the D3.
- Concern that the routes would become less reliable, especially the 108 and D8, which would both become more directly affected by Blackwall Tunnel congestion.

1.5 As a consequence some elements of the scheme were amended. Specifically route 135 was amended to serve Spindrif Avenue and the frequency of the D7 was retained meaning the D7 was left entirely unchanged.

Assessment Methodology

1.6 Section 2 summarises the 2016 service changes. Then the following outcomes have been investigated:

- Change in usage at the route level (section 3)
- Change in usage at the route level relative to mileage operated (section 4)
- Change in usage within different sections of the route (section 5)
- Change in peak hour demand (section 6)
- Change in reliability at the route level (section 7)

- Change in bus speeds at the route level (section 8)

1.7 Within each section more detail regarding the analysis and the data sources is provided followed by the results of the analysis and some interpretation of the results.

Bus Strategy (February 2019)

1.8 The bus route restructurings were designed and implemented prior to the February 2019 Bus Strategy. This sets out TfL's six priorities for the next 2 years. Priority 5 is to 'reshape the bus network'. With regard to central and inner London this means:

- Removing excess capacity through targeted frequency reductions.
- Making routes more direct and improving journey times - primarily through improving the road network for buses and their passengers.

1.9 How the strategy is applied to the outcome of the restructuring is considered within the conclusion of this note.

2 2016 ROUTE RESTRUCTURING AND SUBSEQUENT CHANGES

2.1 The 2016 restructuring largely consisted of swapping the 108 and D8 for parts of their routeing and similarly swapping the D3 with the 277, which also involved re-routeing the 135. Details of the scheme including maps are provided below.

17 September 2016

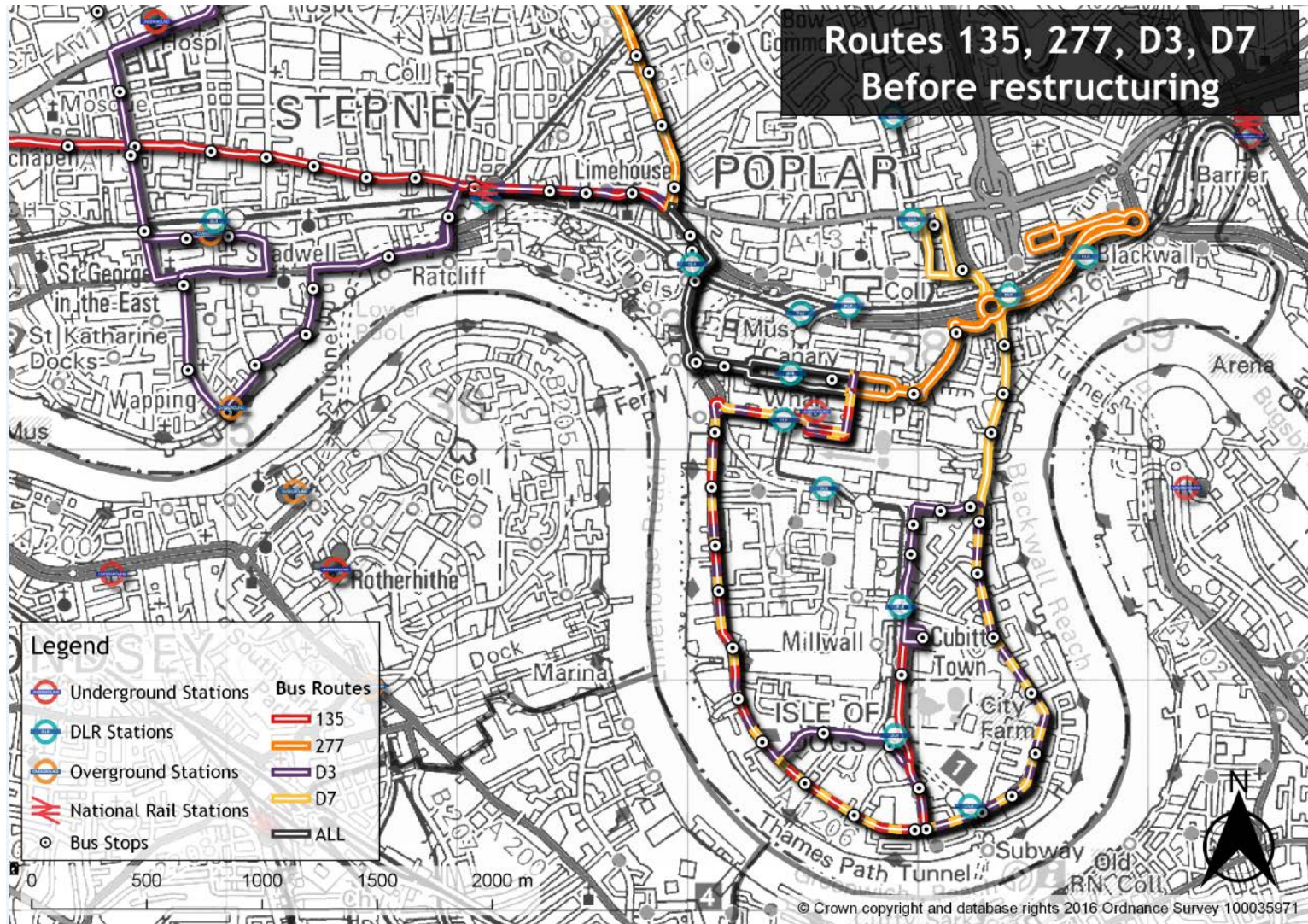
Route	Service Change
135	Restructured. Previously: Old Street Station – Crossharbour, Asda via East Ferry Rd. Became: Old Street Station – Crossharbour, Asda via Manchester Rd. Re-routed at Westferry Road via Spindrift Rd, Manchester Rd, Marsh Wall and Limeharbour.
	Removal of an additional AM Peak journey towards Old Street.
	Frequencies remained 6 bph Mon – Sat (4 bph Sun and Eves).
	Vehicle type remained double deck.
277	Restructured. Previously: Highbury Corner - Leamouth, Saffron Ave Became: Highbury Corner - Crossharbour, Asda. Re-routed at Canary Wharf to serve Westferry Road and East Ferry Road.
	Frequencies remained 9 bph Mon – Sat (6 bph Sun and Eves).
	Vehicle type remained double deck.
D3	Restructured. Previously Bethnal Green – Crossharbour, Asda. Became: Bethnal Green – Leamouth, Saffron Ave. Re-routed at Canary Wharf to serve Trafalgar Way, Aspen Way (temporarily), Saffron Ave.
	Frequencies remained 6 bph Mon – Sat (4 bph Sun and 3 bph Eves).
	Vehicle type remained 55 capacity single deck.

Table 1: Description of 17 September 2016 Service Changes (Scheme 135/277/D3)

1 October 2016

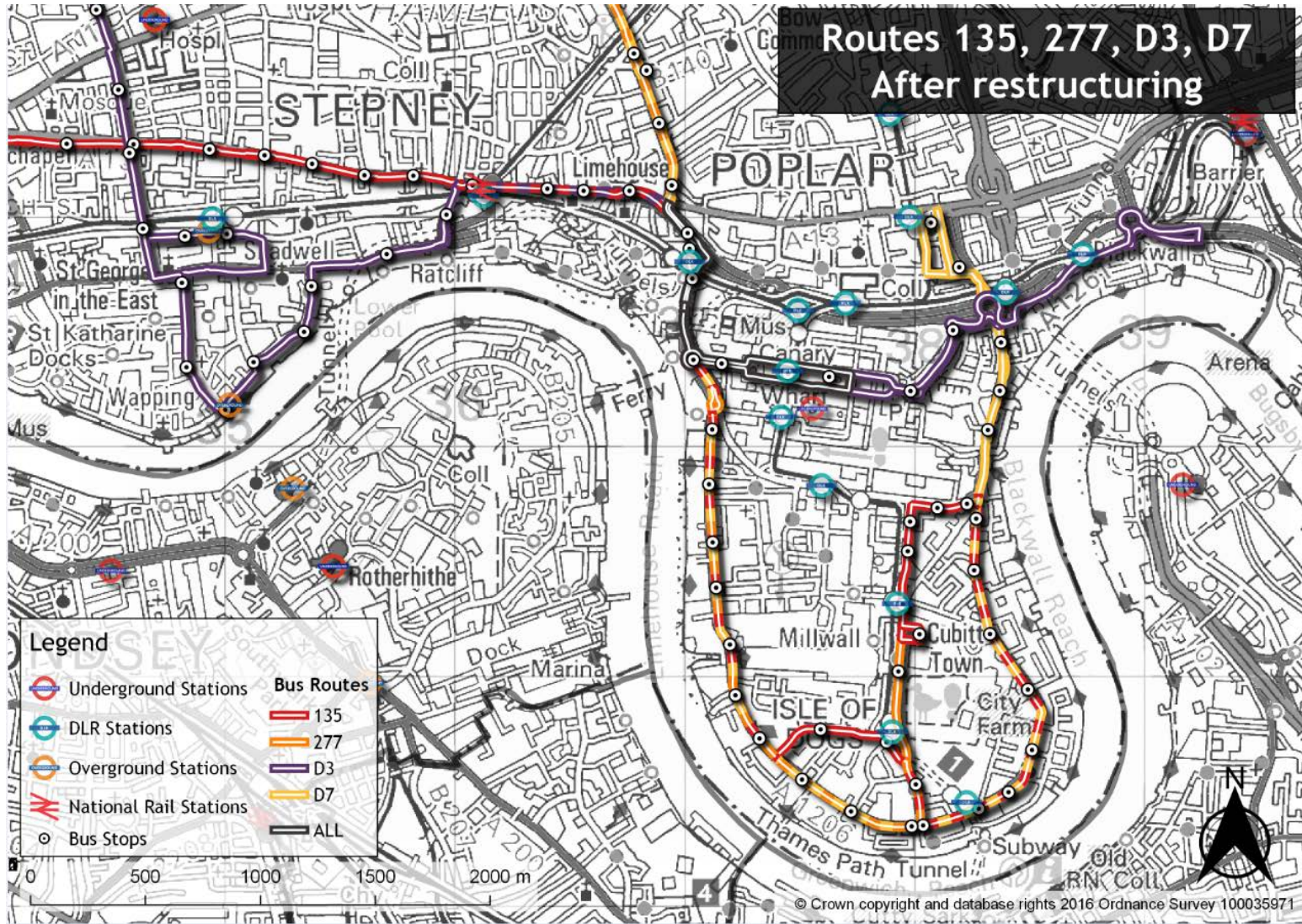
Route	Service Change
108	Restructured. Previously Lewisham – Stratford Bus Station. Became Lewisham – Stratford International. Re-routed at Blackwall Tunnel to serve East India Dock Rd, Chrisp Street, Violet Rd, Campbell Rd and Bow Church and again at Stratford High Street to serve Carpenters Rd, Pool Street, Montfichet Rd and International Way.
	Frequencies remained 6 bph Monday – Saturday (+ 1 MF AM peak journey towards Stratford International; 4 bph Sun and Eves). (The short working evening journeys for the O2 and the night route also remained the same).
	Vehicle type changed from 60 capacity single deck buses to 70 capacity single deck buses.
D8	Restructured. Previously: Crossharbour, Asda – Stratford International. Became Crossharbour, Asda – Stratford Bus Station. Re-routed at East India Dock Rd to serve Blackwall Tunnel Northern Approach Rd and Bow Interchange and again at Stratford High Street to serve Stratford gyratory and bus station.
	Frequencies remained 5 bph Mon – Sat (3 bph Sun and Eves).
	Vehicle type changed from 55 capacity single deck to double deck.

Table 2: Description of 1 October 2016 Service Changes (Scheme 108/D8)



Map 1: Routes 135, 277 and D3 route structures prior to Autumn 2016








Routes 135, 277, D3, D7 After restructuring

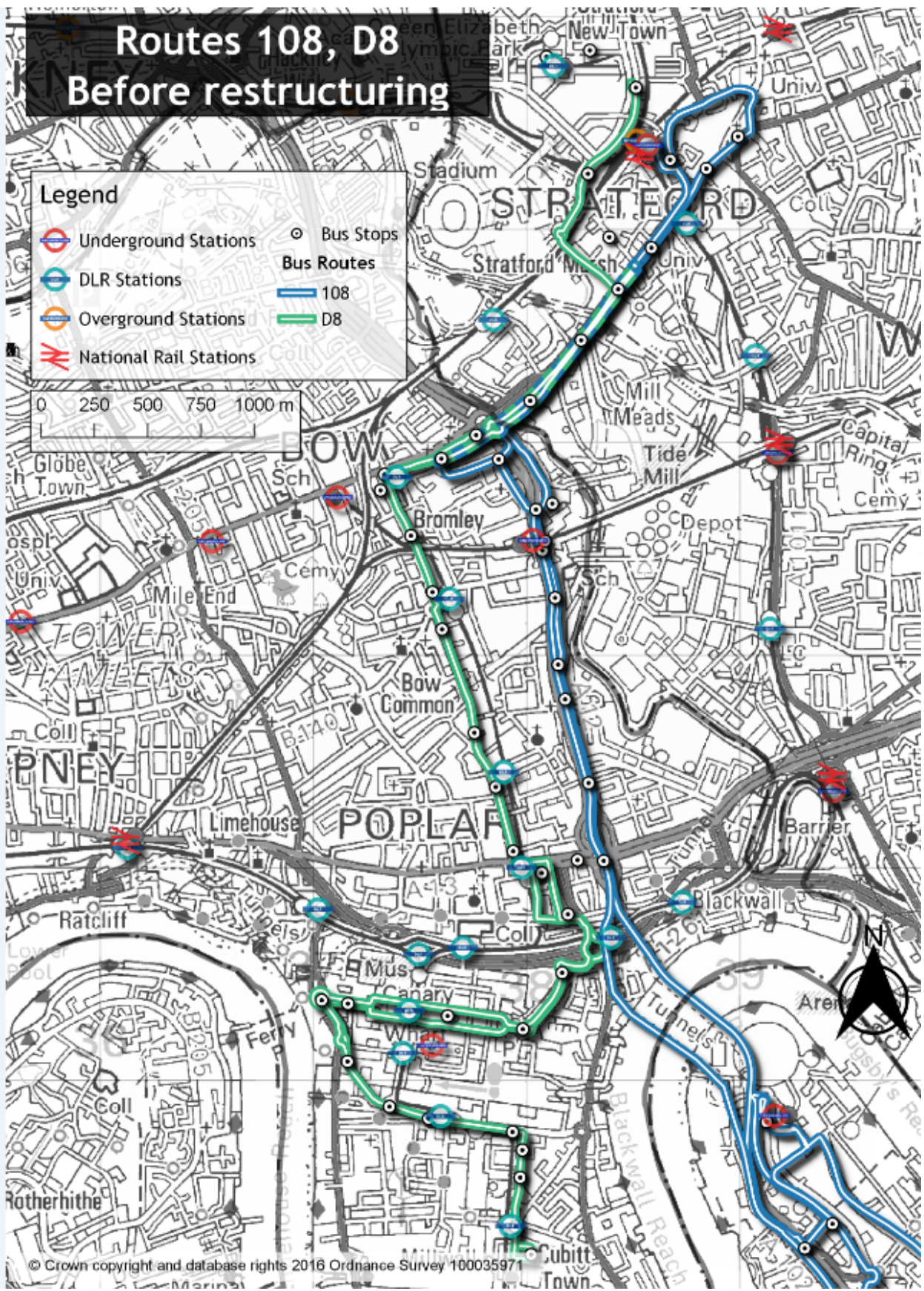


Map 2: Routes 135, 277 and D3 route structures post Autumn 2016

Routes 108, D8 Before restructuring

Legend








-  Underground Stations
-  DLR Stations
-  Overground Stations
-  National Rail Stations
-  Bus Stops
- Bus Routes**
-  108
-  D8



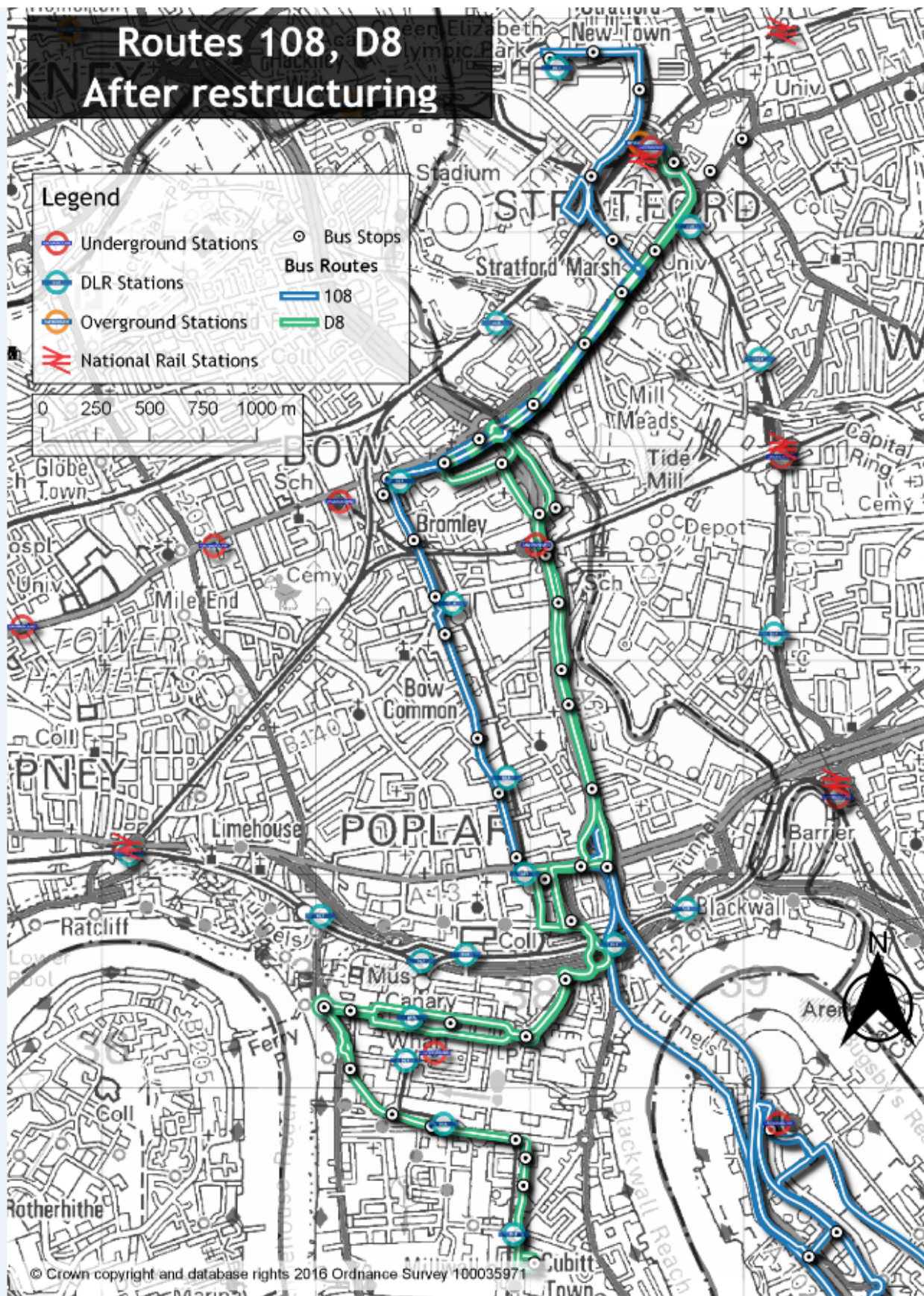
Map 3: Routes 108 and D8 route structures prior to Autumn 2016.

Routes 108, D8 After restructuring

Legend

-  Underground Stations
-  DLR Stations
-  Overground Stations
-  National Rail Stations
-  Bus Stops
- Bus Routes**
-  108
-  D8

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Map 4: Routes 108 and D8 route structures prior to Autumn 2016.

2.2 The changes to routes 135, 277 and D3 (and D8) largely focused on the Isle of Dogs which has a constrained geography. Routes D6 and D7 are the other day routes to serve that location. Including these non-restructured routes in the analysis better captures the network effect of the changes and provides something of a control (especially route D6). Their routing details on 1 October 2016 are provided below.

1 October 2016

Route	Service Change
D6	Routeing: Crossharbour, Asda – Hackney, Ash Grove.
	Frequencies: 8 bph Mon – Sat (4 bph Sun and Eves).
	Vehicle type: 60 capacity single deck.
D7	Routeing: Poplar, All Saints – Mile End Station.
	Frequencies: 9 bph Mon – Fri (7.5 bph Sat; 5 bph Sun and Eves).
	Vehicle type: Double deck.

Table 3: Description of D6 and D7 Service Provision as at 1 October 2016

Subsequent changes

2.3 Since October 2016 there have been a number of changes affecting each of the routes which to some extent will influence travel demand and service provision. The key changes are summarised below with a more comprehensive list provided in appendix A1.

Route	Date	Service Change
108	13-May-17	Introduction of a reliability scheme with increased run times and using an additional bus in the schedule Monday to Friday peaks; interpeaks and weekends. PVR +1
	21-May-17 – 28-Jul-17 and 5-Dec-17 –	Temporary closures of Blackwall Tunnel for maintenance work at night requiring a restructuring of the service between midnight and 0800.

Route	Date	Service Change
	19-Jan-18	
135	01-Oct-16	Removal of temporary widened schedules to mitigate works within the Road Modernisation Plan (RMP) meaning frequencies returned to specified levels. PVR -1
277	12-May-18	New schedule to improve reliability on Friday and Saturday nights.
	30-Jun-18	Route withdrawn between Dalston Junction Bus Station and Highbury Corner and restructured to operate between Dalston Junction Bus Station and Crossharbour, Asda. The route ceases to be a 24 hour service and the new N277 will operate between Crossharbour and Angel Islington. From Highbury Corner buses would serve Upper Street, Pentonville Road and Baron Street to stand at White Lion Street. Buses would return via Upper Street.
D3	29-Apr-17	Re-routed via Blackwall Way rather than Aspen Way following roadworks on Blackwall Way. This was the intended routeing of the 17 September 2016 service change. Also restructured to terminate at Leamouth, Orchard Place and so no longer serves the previous terminus of Leamouth, Saffron Avenue.
	11-Nov-17	Reliability scheme. New schedules with cycle time redistributed to increase evening running times on all days. No change to PVR.
	30-Aug-18– 30-Nov-18	Temporary closure of Blackwall Way. Re-routed back to Aspen Way for the duration of the closure.
D6	15-Sep-18	New contract awarded to a different operator. No change to structure or frequency.

Route	Date	Service Change
D7	15-Sep-18	New schedules with improved driver duties. This results in a redistribution of run time, Monday to Sunday, with minor changes to the public timetable.
D8	15-Sep-18	New contract awarded to a different operator. Rerouted at Stratford to serve Stratford High Street and Great Eastern Road to enter and exit Stratford Bus Station, instead of via The Grove and Broadway.

Table 4: Significant Service Changes between 1 October 2016 – 15 September 2018

3 CHANGE IN USAGE AT THE ROUTE LEVEL

Data and Methodology

- 3.1 Usage at the route level is readily available from BREMS data – essentially electronic ticket machine data modified to reflect non-electronic tickets e.g. under 11s and paper tickets. In 2017 the methodology used to reflect non-ticket usage within BREMS changed. The data presented below has been rebased to reflect this change in methodology making all the numbers directly comparable. BREMS data is not available at the stop level. Consequently it does not explain where on a route usage has changed.
- 3.2 Usage on a route can be significantly impacted by a variety of factors including roadworks, service reliability, routeing changes and frequency changes. Key service changes are listed above with other relatively minor changes provided in appendix A1 and assists interpretation of the data.
- 3.3 A period of several years has been selected to provide a longer term understanding of demand trends by route leading up to the route restructurings together with an understanding of how demand has changed since the changes. The inclusion of routes D6 and D7 provide something of a 'control' and might be interpreted as what is happening to background demand on the local bus network.
- 3.4 To understand change in usage before and after the restructurings, demand has been compared from year to year. To remove the initial disruption to demand created by the service changes themselves, weeks 2016 35 to 2016 43 have been excluded from the analysis. Although this means the post-change data weeks differ from the pre-change data weeks, it is still a full years worth of data and so should still be comparable as seasonality impacts are included within both before and after data.
- 3.5 However, it will be noted that a second full years worth of post-change data has not been used. This is so as to exclude the major restructuring of the 277 from the analysis which took place from 2018, week 26. It also excludes a fairly major restructuring of the D8 at Stratford that took place in 2018, week 37. Therefore, to

enable comparisons over time, table 5 presents average weekly usage. Since the most recent data is only averaged across 35 weeks rather than a full year it is possible there is some distortion from seasonal changes in demand. Therefore table 6 presents the average weekly usage for the same number of weeks for each year.

Change in aggregate route level usage

3.6 Table 5 shows average weekly usage by route over time and also sub-totalled by scheme. Routes D6 and D7 provide context of background demand.

Route	Yr/Wk	2011 37 to 2012 35	2012 36 to 2013 35	2013 36 to 2014 35	2014 36 to 2015 35	2015 36 to 2016 35	2016 44 to 2017 42	2017 43 to 2018 24
108	Pax	72,096	73,778	70,687	70,788	66,924	65,346	68,384
	%		2.3	(4.4)	0.1	(5.8)	(2.4)	4.4
D8	Pax	28,901	28,323	28,455	27,654	25,125	24,110	27,240
	%		(2.0)	0.5	(2.9)	(10.1)	(4.2)	11.5
Subtotal	Pax	100,997	102,102	99,142	98,442	92,050	89,456	95,625
	%		1.1	(3.0)	(0.7)	(6.9)	(2.9)	6.5
135	Pax	78,897	78,010	78,780	70,519	60,924	66,907	69,104
	%		(1.1)	1.0	(11.7)	(15.7)	8.9	3.2
277	Pax	137,059	137,844	140,478	137,155	130,450	149,731	156,454
	%		0.6	1.9	(2.4)	(5.1)	12.9	4.3
D3	Pax	55,185	53,064	51,505	47,247	45,374	29,956	33,974
	%		(4.0)	(3.0)	(9.0)	(4.1)	(51.5)	11.8
Subtotal	Pax	271,142	268,919	270,764	254,922	236,749	246,594	259,534
	%		(0.8)	0.7	(6.2)	(7.7)	4.0	5.0
All Restructured Routes	Pax	372,140	371,022	369,907	353,365	328,800	336,051	355,160
	%		(0.3)	(0.3)	(4.7)	(7.5)	2.2	5.4
D6	Pax	84,987	83,891	71,682	68,532	67,559	67,659	67,542
	%		(1.3)	(17.0)	(4.6)	(1.4)	0.1	(0.2)
D7	Pax	70,562	69,446	81,700	75,454	72,519	70,968	72,649
	%		(1.6)	15.0	(8.3)	(4.0)	(2.2)	2.3
Subtotal	Pax	155,549	153,337	153,383	143,986	140,079	138,628	140,192
	%		(1.4)	0.0	(6.5)	(2.8)	(1.0)	1.1

Table 5: Average Weekly Passenger Trips by Year 2011/12 – 2017/18

Source: BREMS (rebased) Note: The thick line marks when routes were restructured

- 3.7 The table shows a broad trend of declining usage on all routes prior to the autumn 2016 service change followed by an increase in usage afterwards on the restructured routes and a stabilisation on the unchanged routes.
- 3.8 It is noticeable that prior to restructuring each route saw a significant reduction in demand (5% or more) either in the years 2014/15 or 2015/16 or even both. This coincides with the roadworks to upgrade CS2 that commenced in February 2015 and the Aldgate gyratory removal which began in January 2015. Both took around 2 years to build and had a significant impact on the wider Tower Hamlets road network and is a likely explanation of the drop in bus demand. However that does not alter the fact that usage was commonly declining prior to the roadworks in any case.
- 3.9 The 17% drop in usage on route D6 in 2013/14 will mainly be explained by its withdrawal between Ash Grove and Hackney Town Centre in June 2013 following the closure of the Narrowway to buses.
- 3.10 Usage on route D7 was higher in 2015/16 compared to 2011/12 but this is due to a 15% increase in usage in 2013/14 driven by a frequency increase from 7.5 bph to 9 bph in August 2013. This was done in response to capacity complaints on the Westferry Road corridor in the busiest hour and to accommodate expected future demand from new development.
- 3.11 Usage in the first year following the restructuring is a mixed picture with the 108/D8 scheme showing a 3% overall reduction. However this is offset by the 135/277/D3 scheme which had an overall growth of 4% which nets out at 2.2% when both schemes are combined.
- 3.12 The 135/277/D3 scheme includes a 51.5% reduction in demand on route D3. This might be expected given the route was deliberately taken off its busiest corridor. However growth on parallel routes 135 and 277 is in excess of the loss of demand seen on route D3 (and D7) combined.

- 3.13 From the data available in the second year post the changes, both schemes show strong growth in usage on every route. Of note is the recent 12% increase in demand on route D3.
- 3.14 Finally the 'control' routes show zero change in usage after autumn 2016. In other words the decline in trips has stopped and usage stabilised. This suggests that background demand changes are not obviously the explanation for the growth in usage on the two restructuring schemes nor that growth in usage on the changed routes has been due in the main to abstraction from routes D6 and D7.
- 3.15 As noted above, seasonality may distort the second year of after data. Therefore table 6 shows average weekly passenger trips for an identical observation time period (end of October to mid June).

Route	Yr/Wk	2011 43 to 2012 24	2012 43 to 2013 24	2013 43 to 2014 24	2014 43 to 2015 24	2015 43 to 2016 24	2016 43 to 2017 24	2017 43 to 2018 24
108	Pax	71,099	72,548	70,624	70,260	66,495	63,982	68,384
	%		2.0	(2.7)	(0.5)	(5.7)	(3.9)	6.4
D8	Pax	28,791	27,926	28,528	26,829	24,397	22,584	27,240
	%		(3.1)	2.1	(6.3)	(10.0)	(8.0)	17.1
Subtotal	Pax	99,890	100,475	99,153	97,090	90,893	86,567	95,625
	%		0.6	(1.3)	(2.1)	(6.8)	(5.0)	9.5
135	Pax	78,758	77,512	78,796	69,481	60,355	64,905	69,104
	%		(1.6)	1.6	(13.4)	(15.1)	7.0	6.1
277	Pax	136,682	136,854	140,740	137,925	130,378	147,618	156,454
	%		0.1	2.8	(2.0)	(5.8)	11.7	5.6
D3	Pax	55,693	52,893	51,712	47,601	44,887	28,026	33,974
	%		(5.3)	(2.3)	(8.6)	(6.0)	(60.2)	17.5
Subtotal	Pax	271,134	267,261	271,249	255,008	235,621	240,550	259,534
	%		(1.4)	1.5	(6.4)	(8.2)	2.0	7.3
All Restructured Routes	Pax	371,024	367,736	370,402	352,098	326,514	327,118	355,160
	%		(0.9)	0.7	(5.2)	(7.8)	0.2	7.9
D6	Pax	85,700	87,261	72,093	69,479	67,977	66,973	67,542
	%		1.8	(21.0)	(3.8)	(2.2)	(1.5)	0.8
D7	Pax	72,100	70,000	82,219	75,899	72,629	69,948	72,649
	%		(3.0)	14.9	(8.3)	(4.5)	(3.8)	3.7
Subtotal	Pax	157,800	157,261	154,312	145,379	140,607	136,921	140,192
	%		(0.3)	(1.9)	(6.1)	(3.4)	(2.7)	2.3

Table 6: Average Weekly Passenger Trips October to June by Year

Source: BREMS (rebased) Note: The thick line marks when routes were restructured

3.16 The table above generally supports the previous observations: passenger demand has increased on the restructured routes since the schemes were implemented, particularly in the second year. This growth is in excess of that seen on the control routes D6 and D7 where passenger trips have remained stable since autumn 2016.

3.17 Table 6 indicates that about 29,000 extra weekly trips have been generated on the restructured routes in 2017/18. This represents more than a 8% increase in 2015/16

demand. This is in line with the aggregate forecast which predicted just under 30,000 additional passenger trips per day. However that hides some large variations by scheme.

- 3.18 Table 6 shows actual usage for the 108/D8 has increased by 4,700 trips per week against a forecast of 9,700. In other words the scheme has only generated 50% of the trips predicted. Given that usage grew only in the second year following implementation it is to be hoped that the popularity of the new links provided by the restructuring will continue to grow as travel patterns mature. As shown below, Sunday usage has been particularly poor on the 108 and this will explain some of the discrepancy.
- 3.19 An extra 20,000 trips per week were forecast to be generated by the 135 / 277 / D3 scheme. Table 6 puts the actual figure at 24,000. Therefore around 20% more trips have materialised than forecast. Although this scheme did create new travel opportunities it also recreated existing links using alternative bus routes that better allocated capacity to demand on different corridors. It may be that new trips generated by the new development have materialised quicker than forecast and have made use of the additional capacity provided.

Change in route level usage by day type

- 3.20 To understand the usage change further, the same data source (BREMS) has been interrogated further to understand demand change by day type – namely weekdays; Saturdays and Sundays. Bank holidays are excluded from the data. The same data sample has been used as in table 5 above.

Route	Yr/Wk	2011 37 to 2012 35	2012 36 to 2013 35	2013 36 to 2014 35	2014 36 to 2015 35	2015 36 to 2016 35	2016 44 to 2017 42	2017 43 to 2018 24
108	Pax	10,555	10,838	10,471	10,480	9,852	9,575	10,227
	%		2.6	(3.5)	0.1	(6.4)	(2.9)	6.4
D8	Pax	4,284	4,264	4,273	4,223	3,873	3,672	4,263
	%		(0.5)	0.2	(1.2)	(9.0)	(5.5)	13.9
Subtotal	Pax	14,840	15,103	14,744	14,704	13,725	13,248	14,490
	%		1.7	(2.4)	(0.3)	(7.1)	(3.6)	8.6
135	Pax	12,416	12,301	12,374	11,101	9,392	10,426	10,824
	%		(0.9)	0.6	(11.5)	(18.2)	9.9	3.7
277	Pax	20,967	21,045	21,408	20,843	19,952	22,702	23,659
	%		0.4	1.7	(2.7)	(4.5)	12.1	4.0
D3	Pax	8,498	8,265	7,946	7,394	7,065	4,649	5,343
	%		(2.8)	(4.0)	(7.5)	(4.7)	(52.0)	13.0
Subtotal	Pax	41,882	41,611	41,729	39,339	36,410	37,778	39,826
	%		(0.7)	0.3	(6.1)	(8.0)	3.6	5.1
All Restructured Routes	Pax	56,722	56,714	56,474	54,043	50,136	51,026	54,317
	%		(0.0)	(0.4)	(4.5)	(7.8)	1.7	6.1
D6	Pax	13,312	13,145	11,314	10,882	10,780	10,725	10,722
	%		(1.3)	(16.2)	(4.0)	(0.9)	(0.5)	(0.0)
D7	Pax	11,159	11,054	13,120	12,117	11,565	11,345	11,614
	%		(0.9)	15.7	(8.3)	(4.8)	(1.9)	2.3
Subtotal	Pax	24,472	24,200	24,434	23,000	22,346	22,070	22,336
	%		(1.1)	1.0	(6.2)	(2.9)	(1.3)	1.2

Table 7: Average Weekly Weekday Passenger Trips by Year 2011/12 – 2017/18

Source: BREMS (rebased) Note: The thick line marks when routes were restructured

3.21 Given that weekday travel accounts for most weekly travel it is not surprising that the trend for weekdays is essentially the same as that for the route level as seen in table 5.

Route	Yr/Wk	2011 37 to 2012 35	2012 36 to 2013 35	2013 36 to 2014 35	2014 36 to 2015 35	2015 36 to 2016 35	2016 44 to 2017 42	2017 43 to 2018 24
108	Pax	10,458	10,576	10,012	10,234	9,567	9,303	9,430
	%		1.1	(5.6)	2.2	(7.0)	(2.8)	1.3
D8	Pax	4,517	4,149	4,145	3,910	3,378	3,363	3,449
	%		(8.9)	(0.1)	(6.0)	(15.7)	(0.4)	2.5
Subtotal	Pax	14,976	14,726	14,157	14,145	12,945	12,667	12,879
	%		(1.7)	(4.0)	(0.1)	(9.3)	(2.2)	1.6
135	Pax	9,055	8,812	9,172	8,355	7,445	7,996	8,146
	%		(2.8)	3.9	(9.8)	(12.2)	6.9	1.8
277	Pax	17,802	17,865	18,734	18,537	16,553	19,471	20,557
	%		0.4	4.6	(1.1)	(12.0)	15.0	5.3
D3	Pax	7,116	6,493	6,697	5,958	5,630	3,850	4,147
	%		(9.6)	3.0	(12.4)	(5.8)	(46.2)	7.2
Subtotal	Pax	33,974	33,171	34,604	32,851	29,629	31,318	32,851
	%		(2.4)	4.1	(5.3)	(10.9)	5.4	4.7
All Restructured Routes	Pax	48,950	47,897	48,762	46,996	42,575	43,985	45,730
	%		(2.2)	1.8	(3.8)	(10.4)	3.2	3.8
D6	Pax	10,913	10,737	8,999	8,520	8,015	8,183	8,146
	%		(1.6)	(19.3)	(5.6)	(6.3)	2.1	(0.5)
D7	Pax	8,402	7,900	8,740	8,124	7,850	7,631	7,873
	%		(6.4)	9.6	(7.6)	(3.5)	(2.9)	3.1
Subtotal	Pax	19,316	18,638	17,740	16,644	15,866	15,814	16,019
	%		(3.6)	(5.1)	(6.6)	(4.9)	(0.3)	1.3

Table 8: Average Weekly Saturday Passenger Trips by Year 2011/12 – 2017/18

Source: BREMS (rebased) Note: The thick line marks when routes were restructured

3.22 Saturday usage (table 8) also shows a similar trend to that for weekdays both at the route level and the aggregate scheme level.

Route	Yr/Wk	2011 37 to 2012 35	2012 36 to 2013 35	2013 36 to 2014 35	2014 36 to 2015 35	2015 36 to 2016 35	2016 44 to 2017 42	2017 43 to 2018 24
108	Pax	7,786	7,882	7,435	7,416	7,139	7,084	6,606
	%		1.2	(6.0)	(0.3)	(3.9)	(0.8)	(7.2)
D8	Pax	2,579	2,483	2,574	2,375	2,082	2,027	2,079
	%		(3.9)	3.5	(8.4)	(14.1)	(2.7)	2.5
Subtotal	Pax	10,365	10,365	10,010	9,792	9,222	9,112	8,685
	%		0.0	(3.5)	(2.2)	(6.2)	(1.2)	(4.9)
135	Pax	6,881	6,839	7,011	6,165	5,794	6,032	5,884
	%		(0.6)	2.5	(13.7)	(6.4)	3.9	(2.5)
277	Pax	12,866	13,066	13,300	13,300	12,539	14,670	15,188
	%		1.5	1.8	0.0	(6.1)	14.5	3.4
D3	Pax	4,946	4,654	4,569	3,978	3,890	2,524	2,621
	%		(6.3)	(1.9)	(14.9)	(2.3)	(54.1)	3.7
Subtotal	Pax	24,694	24,559	24,881	23,445	22,224	23,227	23,693
	%		(0.5)	1.3	(6.1)	(5.5)	4.3	2.0
All Restructured Routes	Pax	35,060	34,925	34,892	33,237	31,447	32,339	32,379
	%		(0.4)	(0.1)	(5.0)	(5.7)	2.8	0.1
D6	Pax	6,587	6,548	5,479	5,127	4,892	5,105	4,919
	%		(0.6)	(19.5)	(6.9)	(4.8)	4.2	(3.8)
D7	Pax	5,585	5,527	6,612	6,232	6,097	5,810	5,778
	%		(1.0)	16.4	(6.1)	(2.2)	(4.9)	(0.6)
Subtotal	Pax	12,172	12,075	12,092	11,360	10,990	10,915	10,697
	%		(0.8)	0.1	(6.4)	(3.4)	(0.7)	(2.0)

Table 9: Average Weekly Sunday Passenger Trips by Year 2011/12 – 2017/18

Source: BREMS (rebased) Note: The thick line marks when routes were restructured

3.23 Table 9 shows usage for Sundays. Prior to the restructuring the trend was similar to Mondays to Saturdays i.e. decreasing. Post restructuring the trend is less similar.

3.24 Route 108 has seen a continued decrease in usage, especially in the second year after the service change. Route D8 usage has effectively stabilised at 2015/16 levels

meaning the scheme as a whole has seen a decrease in use with Sunday usage at its lowest since 2011/12.

3.25 Route 135 saw usage declining in the second year following the restructuring making it around 2015/16 levels. In addition route D7, which has a lengthy parallel with the 135 within the Isle of Dogs, has also seen continued decline on Sundays. However despite this, taking the 135, 277 and D3 scheme as a whole, there has still been a modest increase in usage driven in the main by usage on route 277.

3.26 If we assume the non-restructured routes represent background demand then this shows demand to be broadly stable but with a slight decrease. This probably reflects a softening of travel demand on Sundays seen more widely across London.

Summary and interpretation

3.27 It is clear that usage on the restructured routes for the most recent year (2017/18) is significantly higher than in the year prior to the service changes (2015/16). In fact, when aggregated, usage levels on the restructured routes are broadly where they were in 2014/15. In the main, this increase in use of 26,000 - 29,000 extra passenger trips per week on the restructured routes reverses a trend of decline often going back to 2011/12.

3.28 In comparison, route level usage on the unchanged D6 and D7 routes has broadly stabilised following years of decline but has seen no growth since 2015/16. This makes the increase in usage on the restructured routes of over 8% all the more significant.

3.29 At a more granular level these findings hold true for Monday to Saturday travel demand but less so for Sundays.

3.30 In summary, the restructuring appears to have been successful in terms of usage but this assertion is tested further below.

3.31 What is also very noticeable is the decline in travel in 2014/15 and 2015/16. As already noted, this is very likely due to two major roadworks schemes to improve cycling and the urban realm but might also be due to improvements in the DLR (see appendix A3).

4 CHANGE IN USAGE AT THE ROUTE LEVEL RELATIVE TO MILEAGE OPERATED

Data and Methodology

- 4.1 Usage will generally be correlated to the amount of service provided. In effect, the more service offered, the higher usage will be and vice versa. Therefore looking at change in usage independent of service provision gives an incomplete picture.
- 4.2 Scheduled mileage (or Kilometres) provides a measure of service provision. New routes, frequency increases and/or route extensions all represent an increase in service provision whereas withdrawals, frequency reductions and/or curtailments represent a reduced level of service.
- 4.3 TfL measures both scheduled mileage and operated mileage. Operated mileage will be lower than scheduled mileage due to service disruptions. Factors disrupting the service may be internal to the operator e.g. driver shortages or mechanical failures or external to the operator e.g. road works and road closures. Operators are financially incentivised to provide the full level of service and these days the biggest cause of lost mileage by far is due to traffic congestion.

Change in usage per mile operated

- 4.4 The 108 scheme made the route longer and so increased scheduled mileage whereas scheduled mileage reduced on the D8. However the net effect for the scheme as a whole was an increase. The analysis provided below does not include the D8 routing change due to Stratford gyratory or the N108.
- 4.5 The 135/277/D3 scheme also increased scheduled mileage overall due to the 135 and 277 becoming longer routes. These increases offset the reduction in mileage on the D3. The 277 cut back to Dalston is also not included in the analysis below and nor is the N277.
- 4.6 Table 10 shows change in usage and operated mileage by route before and after the restructuring which can then be sub-totalled by scheme. By dividing the two numbers, passenger trips per mile operated can be obtained. The data sample is a year before

the 108/D8 service change compared with a year after the service change with a period of 9 weeks in between excluded to account for the difference in the dates of the two restructuring schemes and to allow a bit of time for the service changes to bed down.

Route	Before			After			Change	
	Pax	Operated Mileage	Pax/mile	Pax	Operated Mileage	Pax/mile	dPax	dOperated Mileage
108	3,480,085	686,249	5.1	3,398,018	741,733	4.6	-82,067	55,484
D8	1,306,538	351,793	3.7	1,253,743	336,450	3.7	-52,795	-15,343
Subtotal	4,786,623	1,038,042	4.6	4,651,761	1,078,183	4.3	-134,862	40,141
135	3,168,087	491,252	6.4	3,479,164	627,782	5.5	311,077	136,530
277	6,783,414	786,016	8.6	7,786,013	935,665	8.3	1,002,599	149,649
D3	2,359,495	620,511	3.8	1,557,753	461,784	3.4	-801,742	-158,727
Subtotal	12,310,996	1,897,779	6.5	12,822,930	2,025,231	6.3	511,934	127,452
All routes	17,097,619	2,935,821	5.8	17,474,691	3,103,414	5.6	377,072	167,593
D6	3,513,120	416,063	8.4	3,518,299	416,375	8.4	5,179	312
D7	3,771,037	560,859	6.7	3,690,375	597,844	6.2	-80,662	36,985
Subtotal	7,284,157	976,922	7.5	7,208,674	1,014,219	7.1	-75,483	37,297

Table 10: Before and after change in annual usage, operated mileage and passengers / mile

Source: BREMS

4.7 Table 10 shows passenger usage declined on the 108/D8 scheme as was seen in table 5. However operated mileage increased when the routes are combined resulting in the number of passengers per operated mile reducing overall.

4.8 Part of the change in operated mileage will be due to the changes in scheduled mileage. However part of it is explained by a reduction in the amount of lost mileage i.e. mileage not operated due to highway conditions and other operational reasons. This is looked at further in section 7.

4.9 Passengers per operated mile also reduced on the 135/277/D3 scheme despite usage growing overall. This is due to the amount of miles operated increasing at a faster rate. Again, some of this will be explained by the service changes increasing schedule mileage but it appears that there was also a significant reduction in lost mileage (see section 7). The extra service provided would likely have driven some of the passenger growth.

4.10 On the non-restructured routes, the D6 saw minimal change in operated mileage with no change in passengers per operated mile either. There was a reduction in passengers per operated mile on route D7. In this instance the higher service provision through better service performance has no correlation with usage as patronage declined. A possible explanation for this is the changes to routes 135 and 277 abstracted demand from the D7. Even if so, combined usage across the 135, 277 and D7 was still higher overall following the restructuring.

4.11 Table 10 reflects the first year following the restructuring. However, as was seen in section 3, passenger growth was stronger in the second year. Table 11 looks at the trend of passengers per operated mile over the past 7 years. A full year of data for the second anniversary of the service change is not fully available. Consequently the first value in the table shows annual change and the second value for weeks 43 to 24 of each successive year as per the usage analysis above.

Route	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18
108	5.1 / 5.0	5.3 / 5.2	5.3 / 5.3	5.4 / 5.3	5.1 / 5.0	4.6 / 4.5	- / 4.7
D8	4.8 / 4.7	4.6 / 4.5	4.4 / 4.3	4.0 / 3.8	3.7 / 3.6	3.7 / 3.5	- / 4.2
Subtotal	5.0 / 4.9	5.1 / 5.0	5.0 / 5.0	4.9 / 4.8	4.6 / 4.5	4.3 / 4.2	- / 4.5
135	7.6 / 7.7	7.5 / 7.5	7.7 / 7.6	6.9 / 6.7	6.4 / 6.4	5.5 / 5.4	- / 5.7
277	8.9 / 8.9	9.1 / 9.0	9.2 / 9.2	9.0 / 9.0	8.6 / 8.7	8.3 / 8.2	- / 8.7
D3	4.6 / 4.5	4.4 / 4.3	4.3 / 4.3	3.8 / 3.8	3.8 / 3.8	3.4 / 3.1	- / 3.8
Subtotal	7.2 / 7.2	7.1 / 7.1	7.2 / 7.2	6.8 / 6.7	6.5 / 6.5	6.3 / 6.2	- / 6.6
All Routes	6.4 / 6.4	6.4 / 6.4	6.4 / 6.4	6.1 / 6.0	5.8 / 5.8	5.6 / 5.5	- / 5.9

Route	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18
D6	8.7 / 8.8	9.0 / 9.0	8.9 / 9.0	8.7 / 8.7	8.4 / 8.5	8.4 / 8.4	- / 8.3
D7	7.4 / 7.6	7.2 / 7.3	7.3 / 7.3	6.6 / 6.6	6.7 / 6.7	6.2 / 6.1	- / 6.3
Subtotal	8.1 / 8.2	8.1 / 8.2	8.0 / 8.0	7.5 / 7.5	7.5 / 7.5	7.1 / 7.0	- / 7.1

Table 11: Passenger trips per operated mile compared by year and by weeks 43 - 24 only

Source: BREMS

4.12 With just one exception, the difference between the winter scores and the annual scores is never more than 0.2 and frequently less.

4.13 The trips per operated mile on route 108 were increasing until 2014/15 but then dropped back to 2011/12 levels in 2015/16. Post restructuring there has been a significant drop although it may be recovering. In contrast the D8 saw a clear trend of year on year decline which has reversed since the restructuring. Taken together the improvement on the D8 has not been enough to offset the 108 although trips per mile in 2017/18 have recovered to 2015/16 levels (which in itself was a bad year).

4.14 Passenger trips per mile were fairly steady on route 135 until 2014/15 but then saw two years of big reductions. Since restructuring it has fallen much further still although there are signs of recovery.

4.15 Route 277 saw a gently increase in passengers per operated mile until 2014/15 then two years of reductions. This dropped further in 2016/17 but looks to have recovered to 2015/16 levels.

4.16 Route D3 saw a trend of decline until 2014/15 then stabilisation. 2017/18 data shows usage per operated mile to be back to 2015/16 levels following a dip in the first year following restructuring.

4.17 Taking the scheme as a whole, trips per operated mile are around where they were prior to restructuring.

4.18 The D6 have seen a decline in trips per operated mile since 2012/13 which appears to have continued since autumn 2016. The D7 also saw a drop in the two years prior to the autumn 2016 service changes. Since then trips per operated mile have declined further.

Summary and interpretation

4.19 Section 3 showed a fairly unambiguous picture of increasing bus usage on the restructured bus routes. This improvement is less positive relative to the mileage operated on each route. There are signs that passenger trips per mile operated are broadly recovering back to the position immediately prior to the route restructuring. In fact at the aggregate level there are 5.9 trips per mile in winter 2017/18 compared to 5.8 in winter 2015/16. However 2015/16 did represent the lowest trips per mile operated since 2011/12.

4.20 However, in comparison to the unchanged routes, the restructured routes have fared reasonably well. Whereas usage per operated mile appears to have recovered to the position prior to autumn 2016; the unchanged routes have continued to see a decline – albeit only a small reduction on route D6. It is also worth noting that passenger trips per mile operated on the restructured routes are on an upward trajectory.

4.21 Relevant to this analysis is the improvement in mileage operated which is looked at in more detail in section 7.

5 CHANGE IN USAGE AT THE AREA LEVEL

Data and Methodology

- 5.1 If the route restructurings were responsible for the increase in usage then travel to, from and within the restructured sections would increase more than travel in unchanged sections of route.
- 5.2 Bus Origin Destination Surveys (BODS) have been used to inform this analysis. These surveys are undertaken on a typical weekday for each route and record where each passenger boards and alights. The data generated is of a high quality but a weakness of the survey is the limited availability of the data due to the complexity and cost of the surveys. The before surveys occurred in 2013 (2015 for route 108) which means before usage is likely to be higher than immediately before the restructurings in autumn 2016. After data is from 2017 (2018 for route 108) which means usage is likely to have increased further since the surveys.
- 5.3 To generate the data bus stops have been grouped together in zones. Details of this zoning and the associated trip numbers are provided in appendix A2.
- 5.4 Tables 12 and 14 provide the number of trips to, from and within the defined zone. Consequently the total is not the sum of previous values, as trips are counted in both the origin and destination zones.
- 5.5 To address concerns regarding the timing of the BODS surveys, ODX data has also been used to provide a comparison. For this analysis just the boarding data of those using Oyster or CPC have been used. Consequently this data has not been scaled up to account for non electronic entries (e.g. under 11s) nor has the inferred alighting data been used. Whereas with BODS the data tells us how the number of trips in zone 1 can be disaggregated to inform how many came from zones 2, 3 etc; the ODX data simply states the number of unscaled trips that boarded within zone 1. Consequently, the values included in BODS and ODX tables are not directly comparable since they do not contain the same information.

5.6 Wednesday 7 and Thursday 8 September 2016 were selected as the 'before' dates for the ODX data with Wednesday 6 and Thursday 7 September 2017 selected for the first year of 'after' dates and Wednesday 12 and Thursday 13 September 2018 for the second year. The dates were chosen to be approximately a year apart. The values presented in tables 13 and 15 are an average of each pair of days.

108 / D8 scheme

5.7 Table 12 provides the change in trips to, from and within each zone and is best read in conjunction with the maps in appendix A2.

Zone	Before		After		Difference	
	Route	Trips	Route	Trips	Trips	%age
Isle of Dogs Asda	D8	504	D8	300	(204)	(40%)
Limeharbour	D8	262	D8	247	(15)	(6%)
Marsh Wall	D8	593	D8	647	54	9%
Canary Wharf	D8	702	D8	635	(67)	(10%)
Trafalgar Way	D8	186	D8	378	192	103%
Poplar All Saints	D8	689	D8	1,043	354	51%
Stratford High Street	D8 / 108	1,096	D8 / 108	1,349	253	23%
Blackwall Tunnel Sth App / N Greenwich	108	4,337	108	4,362	25	1%
Zones with Route Continuation		6,684		7,961	1,277	19%
East India Dock Road	n/a	0	108	431	431	N/A
Blackwall Tunnel Northern Approach	108	1,924	D8	2,128	204	11%
Campbell Road	D8	3,217	108	3,731	514	16%
Bow Road	D8	1,763	108	2,005	242	14%
Southern Bifurcation		6,904		8,295	1,391	20%
Stratford Bus Station	108	2,872	D8	2,095	(777)	(27%)
Stratford City / International	D8	1,581	108	2,197	616	39%
Terminus Bifurcation		4,453		4,292	(161)	(4%)
Study Zone		12,281		13,854	1,573	13%
Rest of Route 108 (South of the River)	108	7,244	108	7,354	110	2%
Total		15,721		17,111	1,390	9%

Table 12: Routes 108 and D8: Boarders and alighters by zone before and after restructuring

Source: BODS 108 (4/6/15 and 6/3/18) D8 (14/10/13 and 22/9/17)

Note: Totals sometimes differ from constituent parts to avoid double counting

5.8 Despite table 5 showing usage lower in 2017/18 compared to 2013/15, the data shows the reverse on the days that the routes were surveyed i.e. 17,100 trips in the after surveys compared to 15,700 in the before surveys – a difference of 9%.

5.9 There is some evidence to suggest that the restructuring has proved popular. There has been a 19% growth in travel to, from and within those zones where the base route remains the same. This is despite reductions in usage at Canary Wharf and zones to the south. Where the routes were swapped on the A12 and Campbell Road corridors travel demand to, from and within those zones increased by 20%. However, with regard to the Stratford terminus swap, usage has remained broadly the same.

5.10 This growth in travel contrasts with only a 2% growth south of the river. This is relevant given the relative remoteness of the zone from the study area and therefore perhaps more representative of background change in demand. However, it is noted that the new cross-river travel opportunities to North Greenwich have had little impact on travel demand from this data sample.

5.11 Table 13 summarises the boarders by zone for two days in September over three years.

Zone	Sep-16	Sep-17		Sep-18	
	Boarders	Boarders	% change	Boarders	% change
Isle of Dogs Asda	125	113	(10%)	96	(23%)
Limeharbour	78	158	103%	108	38%
Marsh Wall	156	258	65%	209	34%
Canary Wharf	181	297	64%	350	93%
Trafalgar Way	93	147	58%	177	90%
Poplar All Saints	135	380	181%	432	220%
Stratford High Street	501	444	(11%)	467	(7%)
Blackwall Tunnel Sth App / N Greenwich	1,558	1,515	(3%)	1,666	7%
Zones with Route Continuation	2,827	3,312	17%	3,505	24%
East India Dock Road	0	123	N/A	148	N/A
Blackwall Tunnel Northern Approach	740	787	6%	997	35%
Campbell Road	1,117	1,106	(1%)	1,142	2%
Bow Road	659	647	(2%)	695	5%
Southern Bifurcation	2,516	2,663	6%	2,982	19%
Stratford Bus Station	1,194	858	(28%)	919	(23%)
Stratford City / International	499	558	12%	565	13%
Terminus Bifurcation	1,693	1,416	(16%)	1,484	(12%)
Study Zone	7,036	7,391	5%	7,971	13%
Rest of Route 108 (South of the River)	3,769	3,811	1%	3,578	(5%)
Total	10,805	11,202	4%	11,549	7%

Table 13: Routes 108 and D8: Boarders by zone before and after restructuring

Source: ODX 7 and 8/9/16; 6 and 7/9/17 and 12 and 13/9/18

5.12 The data shows a similar story to table 12. In terms of total numbers of boarders there was a 4% growth in the first September following the restructuring and a 7% growth in the second September. However the growth in boarders in those zones north of the river was higher still in percentage terms (24% versus 19%) and broadly similar for the Southern bifurcation (19% versus 20%). However, as with table 12, boardings at the Stratford termini were lower.

135/277/D3 Scheme

5.13 Table 14 provides the change in trips to, from and within each zone and is best read in conjunction with the maps in appendix A2. Boarders and alighters for route D7 are also included within the data due to the large extent to which it parallels the restructured routes.

Zone	Before		After		Difference	
	Route	Trips	Route	Trips	Trips	%age
Isle of Dogs Asda	135 / D3	1,550	135 / 277	1,198	(352)	(23%)
Limeharbour	D3	288	135	323	35	12%
Manchester Road	D3 / D7	5,821	135 / D7	6,366	545	9%
Spindrift Avenue	D3	559	135	787	228	41%
Westferry Road	135 / D3 / D7	10,144	135 / 277 / D7	10,632	488	5%
Canary Wharf	135 / 277 / D3 / D7	14,585	135 / 277 / D3 / D7	14,269	(316)	(2%)
West India Dock Road	135 / 277 / D3 / D7	2,989	135 / 277 / D3 / D7	2,979	(10)	(0%)
Commercial Road, Limehouse	135 / D3	3,008	135 / D3	3,150	142	5%
East Ferry Road	135	47	277	65	18	38%
South Westferry Road	135 / D7	3,285	277 / D7	2,963	(322)	(10%)
Blackwall Way / Saffron Avenue	277	634	D3	1,598	964	152%
Trafalgar Way	D3	424	277	544	120	28%
Poplar All Saints	D7	2,092	D7	2,559	467	22%
Prestons Road	D7	476	D7	871	395	83%
Study Zone		30,232		31,642	1,410	5%
Rest of Route 135		7,839		8,270	431	5%
Rest of Routes 277 / D7		24,761		25,341	580	2%
Rest of Route D3		4,184		4,717	533	13%
Total		53,984		57,003	3,019	6%

Table 14: Routes 135, 277, D3 and D7: Boarders and alighters by zone before and after restructuring

Source: BODS 135 (25/2/13 and 1/11/17) 277 (12/9/13 and 14/9/17) D3 (22/10/13 and 20/11/17) D7 (4/11/13 and 30/10/17).

Note: Totals sometimes differ from constituent parts to avoid double counting

5.14 The data does not provide a clear narrative. It shows growth in usage of 6% overall despite 2017 usage being lower than 2013 usage at the global level. This probably

reflects the sample size. In contrast the study zone saw growth in usage of 5% of which a significant proportion is due to the Poplar All Saints and Preston's Road zones which were relatively unaffected by the restructuring.

5.15 As with table 12, there have been declines at Isle of Dogs Asda and Canary Wharf. It is possible this is due to broken travel connections caused by the restructuring although other restructured zones have seen an increase in trips.

5.16 A key objective of the restructuring was to put additional capacity onto the Westferry Road corridor by replacing the 6 bph single deck D3 with the 9 bph double deck 277. To that end the Westferry Road zone has been able to accommodate a 5% increase in demand although the South Westferry Road zone has seen a 10% decrease. The other implication of the route swap was locations east of Canary Wharf got a lower frequency and capacity that was much more closely aligned with demand. Despite this the Blackwall Way / Saffron Avenue zone saw trips grow by 152% (from a low base) and the Trafalgar Way zone grow by 28%. This growth is probably down to new trips from new development and being able to serve the development south of Aspen Way by the works Tower Hamlets did to enable the re-routeing via Blackwall Way.

5.17 A concern during consultation was broken trips from Manchester Road to Spindrif Avenue which were retained by alternating the 135 routeing. Both these zones saw an increase in trips – especially Spindrif Avenue. There were also concerns about broken links on the D3 to places like Wapping and Whitechapel. However, this has not affected overall demand as trips have increased.

5.18 Table 15 summarises the boarders by zone for two days in September over three years.

Zone	Sep-16	Sep-17		Sep-18	
	Boarders	Boarders	% change	Boarders	% change
Isle of Dogs Asda	361	466	29%	459	27%
Limeharbour	59	158	168%	95	61%
Manchester Road	2,155	2,595	20%	2,471	15%
Spindrift Avenue	110	234	113%	196	78%
Westferry Road	3,433	3,653	6%	3,981	16%
Canary Wharf	3,474	4,444	28%	5,289	52%
West India Dock Road	907	1,225	35%	1,030	14%
Commercial Road, Limehouse	977	1,071	10%	1,106	13%
East Ferry Road	4	59	1375%	9	125%
South Westferry Road	895	1,067	19%	1,037	16%
Blackwall Way / Saffron Avenue	0	388	N/A	477	N/A
Trafalgar Way	131	138	5%	166	27%
Poplar All Saints	773	915	18%	861	11%
Prestons Road	237	270	14%	305	29%
Study Zone	13,516	16,683	23%	17,482	29%
Rest of Route 135	3,018	4,172	38%	4,604	53%
Rest of Routes 277 / D7	15,370	15,743	2%	13,418	(13%)
Rest of Route D3	2,555	2,312	(10%)	2,403	(6%)
Total	34,459	38,910	13%	37,907	10%

Table 15: Routes 135, 277, D3 and D7: Boarders by zone before and after restructuring
Source: ODX 7 and 8/9/16; 6 and 7/9/17 and 12 and 13/9/18

5.19 Table 15 makes the narrative even less clear. Within the study area usage is consistently higher after restructuring compared with prior whereas outside the study area usage has decreased on the D3 and the D7 and 277 combined. (Although the curtailment of the 277 at Dalston in May 2018 is probably a significant factor). The growth in boarders within the study zone of 23% in 2017 and 29% in 2018 compares favourably with the total change of 13% and 10% respectively. Both these trends are different from that seen in table 14.

5.20 The remaining route in the study area is the D6. When surveyed on 14 October 2013 10,687 trips were recorded. On 22 September 2017 this had increased by 877 trips or 8% to 11,564 trips.

Summary and interpretation

5.21 The data shows usage has grown post restructuring which is positive. For the 108/D8 scheme there is some evidence that swapping the routes between the Campbell Road

and the A12 corridor has been successful. It is less apparent that the Stratford terminus swap or the new cross river links have been particularly successful yet but they have certainly not affected the overall positive picture.

5.22 With regard to the 135/277/D3 scheme, usage has also grown. The extent to which the restructuring can explain this is not clear – usage is perhaps down at Crossharbour Asda and Canary Wharf but up in other locations in the Isle of Dogs. What is clear is that any disruption from the restructuring has not not been to the detriment of the overall picture.

6 CHANGE IN USAGE IN THE BUSIEST HOUR

Data and Methodology

6.1 This section uses ODX data to look at usage at the busiest point in the busiest hour in the busiest direction. This is the demand that typically determines the frequency of a bus route. The analysis focuses on the busiest point of each route and then considers key corridors relevant to the study area.

Change in hourly demand at the busiest point

6.2 Table 16 summarises passenger demand at the busiest point for each route and compares it with the hourly planning capacity for the corridor i.e. the amount of space the buses provide.

Busiest Point	Direction	Pre-Restructuring (September 2016)					Post-Restructuring (September 2018)				
		Route	Hour Beginning	Demand	Supply	Available capacity	Route	Hour Beginning	Demand	Supply	Available capacity
Commercial Rd (Stepney Methodist Church)	WB	135	07:51	364	420	56	135	07:47	396	420	24
Mile End Station	EB	277	07:48	512	630	118	277	07:54	608	630	22
Canary Wharf from Leamouth	WB	277	08:19	209	630	421	D3	08:07	195	270	75
Westferry Road (Marsh Wall/Heron Quay)	WB	D7	07:45	521	630	109	D7	07:48	324	630	306
North Greenwich	SB	108	17:47	329	270	-59	108	17:38	337	330	-7
Bow Flyover	NB/SB	D8	16:52	262	225	-37	D8	08:09	237	350	113
Burdett Rd (St Paul's Way)	NB	D6	08:00	397	405	8	D6	07:45	391	405	14

Table 16: Before and after change in hourly demand at the busiest point

6.3 It can be seen that hourly demand has grown on the 135 at Commercial Road near Limehouse station but that hourly provision still matches demand. Similarly on the 277 departing Mile End station towards Canary Wharf.

- 6.4 The busiest point on the D3 is now Canary Wharf from the Leamouth direction. Prior to restructuring it was Westferry Road. Peak hourly demand has declined slightly on this corridor which might be expected given the 277 provided 9 bph whereas the D3 provides 6 bph. Although there is a better match between provision and demand as intended by the service redesign, there is still an excess of capacity provided.
- 6.5 Peak hour usage has significantly declined on route D7 and there is now an excess in peak hour provision of around 4 buses per hour. It had originally been proposed to reduce the frequency of the D7 from 9 bph to 7.5 bph but this was not implemented in response to consultation.
- 6.6 Arriving at North Greenwich from the south continues to be the busiest point on route 108 and has benefitted from higher capacity single deck buses being deployed on the route. Although the table shows demand to be slightly higher than supply, it should be noted that the hourly planning capacities represent 85% of actual capacity provided by the vehicles. In addition the 108 is paralleled by a number of other routes through the North Greenwich peninsula providing additional capacity.
- 6.7 Hourly provision has increased on the D8 but peak hour demand has reduced resulting in excess peak hour capacity. However BODS data from September 2017 shows an individual bus carrying up to 75 passengers southbound at Bow school. These passengers would not all have been able to board the first bus had it been single deck.
- 6.8 Finally, demand has essentially remained unchanged on the D6 and continues to be well matched by the capacity provided.
- 6.9 Table 17 summarises demand on key corridors within the study area.

Corridors	Direction	Pre-Restructuring (September 2016)					Post-Restructuring (September 2018)				
		Route	Hour Beginning	Demand	Supply	Available capacity	Route	Hour Beginning	Demand	Supply	Available capacity
Westferry Road (Marsh Wall/Heron Quay)	NB	135	07:48	947	1378	431	135	07:37	1004	1680	676
	NB	D3					277				
	NB	D7					D7				
Campbell Road (Devons Rd)	SB	D8	16:05	167	225	58	108	15:08	172	330	158
A12 (Bow School)	NB	108	08:46	154	270	116	D8	07:59	198	350	152
	SB	108	15:24	158	270	112	D8	15:26	194	350	156
Mile End Station	EB	277	07:57	653	1260	607	277	07:54	641	1260	619
		D7									
	WB	277	07:48	709	1260	551	277	07:57	583	1260	677
		D7									

Table 17: Before and after change in hourly demand on key corridors

6.10 Westferry Road is a key corridor in the study area. In the 2014 South Tower Hamlets review peak hour demand northbound in the AM peak was 1,349 against a hourly planning provision of 1,378. As seen in table 5 above, a big reduction in daily demand in 2014/15 and 2015/16 appears to have also materialised in peak hour demand. By September 2016 peak hour demand was around 950 passengers and the busiest point on route 135 had become Limehouse station rather than Westferry Road. Although demand has increased since, excess peak hour provision is still around 9 bph.

6.11 Peak hour demand has grown marginally on the Campbell Road corridor in 2018 compared to 2016 but by 20% from the 2014 analysis when demand was 142. Although there is excess peak hour capacity on the corridor due to the 108 providing more capacity than the previous D8 service, there is no scope to reduce this as the 108 is at capacity at North Greenwich.

6.12 Demand has also grown on the A12 corridor despite it being served by a different route.

6.13 The combined peak hour demand of the 277 and D7 at Mile End station has declined. In 2014 the peak hour demand was 950. This means there is excess peak hour capacity. As seen from table 16, it would be better to take this capacity from the D7 rather than the 277.

Summary and interpretation

- 6.14 Peak hour usage has broadly increased in 2018 compared to 2016. However, in comparison to the 2014 South Tower Hamlets review peak hour usage is down, most noticeably on the Westferry Road corridor. Considering the drop in daily usage prior to autumn 2016, this might be expected.
- 6.15 However, in many cases the peak hour service provision is well matched to demand at the busiest point.
- 6.16 Route D7 is a key exception and there appears to be scope to reduce the frequency despite the scale of development still planned for the Isle of Dogs.
- 6.17 Similarly, despite the success of the Leamouth to Canary Wharf corridor there appears to be scope to reduce the frequency of the D3 although there is new development still to be occupied at City Island, Leamouth South and East India Dock.

7 RELIABILITY AT THE ROUTE LEVEL

Data and Methodology

- 7.1 All routes in the study area are high frequency (every 12 minutes or better) and therefore reliability is measured in terms of Excess Wait Time (EWT). This is the additional time passengers wait for a bus over and above the scheduled wait time and is measured in minutes. Therefore the lower the score the more reliable the service is.
- 7.2 The route restructuring occurred during Quarter 3 (Q3) of 2016/2017 and so it is preferable not to include this within the data sample. Q4 2018/19 data was not available at the time of the review. Consequently the analysis has focused on comparing Q1 and Q2 data over the four years 2015 to 2018. This is presented in table 18.
- 7.3 Whereas EWT measures the punctuality of the service, lost mileage measures the level of service operated. In order to operate buses at even headways it can be necessary to curtail buses to remove bunching meaning the bus does not run the full length of the route. Other factors such as mechanical faults may also result in lost mileage although traffic congestion is the single biggest cause.
- 7.4 Table 19 summarises the percentage of scheduled mileage recorded as not being operated for 5 years prior to the service change and 2 years after. As with the usage analysis above, the weeks in close proximity to the service change have been excluded as it takes time for operators and passengers to get used to the new route structures and timetables. Therefore the weeks selected differ between before and after the service change. However, it is still a full years worth of data and therefore comparable.
- 7.5 It is worth noting that the period 2017 43 to 2018 42 includes the shortening of route 277 to operate from Dalston (effective from 2018 week 26) and the changes to route D8 following the Stratford gyratory change (effective from 2018 week 37).

EWT analysis

EWT	Min Std	Q1 (April to June)				Q2 (June to September)			
Route		2015	2016	2017	2018	2015	2016	2017	2018
108	1.3	1.50	1.44	1.37	1.10	1.39	1.20	1.21	0.90
D8	0.9	0.78	0.93	0.44	0.46	1.11	1.00	0.42	0.61
135	1.0	1.15	0.93	0.68	0.78	1.72	0.82	0.75	0.68
277	1.1	1.30	1.31	1.12	0.97	1.30	1.09	1.02	0.84
D3	1.1	0.90	1.02	1.05	0.97	0.78	0.90	0.95	0.89
D6	1.1	1.27	0.91	0.64	0.72	1.23	0.81	0.95	0.64
D7	1.0	1.18	0.93	0.78	0.65	1.35	0.73	0.69	0.59

Table 18: Q1 and Q2 Excess Wait Time by Route 2015 – 2018

Numbers in red are worse than the minimum performance standard set for the route

7.6 Route D3 reliability has remained broadly the same across four years and always better than its performance standard.

7.7 All other routes were failing to meet their target in at least one quarter of 2015. Reliability was better in the first two quarters of 2016 but three routes still failed to meet their standard for one quarter. This reflects the difficult operating conditions facing bus routes in Tower Hamlets given the volume of roadworks at the time.

7.8 Post restructuring, all routes have seen an improvement in reliability in 2018 compared to 2016 (and 2015) and are performing better than their performance standard. For routes D8, 135 and D7 the improvement has been considerable.

7.9 Since the non-restructured routes have seen the same improvements as the restructured routes, it suggests that the cause is most likely due to improved operation of the road network within Tower Hamlets. However, new route structures have clearly not had a negative impact in absolute terms (it is possible reliability could have been better still on their original routeings). This is of note as responses to consultation expressed significant concern that the new routeings would negatively affect reliability – especially on routes 108 and D8.

Lost mileage analysis

Route	201137 to 201235	201236 to 201335	201336 to 201435	201436 to 201535	201536 to 201635	201644 to 201742	201743 to 201842
108	3.60	2.61	4.54	4.68	4.75	4.73	2.29
D8	5.04	2.01	2.92	2.44	3.87	1.51	1.36
Subtotal	4.03	2.43	4.01	3.92	4.45	3.75	2.01
135	3.10	2.00	2.57	4.86	9.46	3.39	2.51
277	1.94	2.46	1.91	2.76	3.26	1.58	1.21
D3	3.22	2.26	3.76	3.43	3.31	2.46	1.71
Subtotal	2.67	2.27	2.69	3.55	4.96	2.35	1.74
All Routes	3.15	2.32	3.15	3.68	4.78	2.84	1.83
D6	1.82	2.04	1.80	3.41	2.30	2.83	1.57
D7	3.38	2.63	2.38	4.48	4.67	2.68	1.85
Subtotal	2.60	2.34	2.14	4.05	3.67	2.74	1.74

Table 19: Percentage of scheduled mileage not operated by route and scheme 2011/12 – 2017/18

7.10 Lost mileage was high on all the restructured routes prior to the service change with a range of 2.32% to 4.78% lost mileage. Only route 277 managed less than 2% in two years out of five. The non-restructured routes did better although were rarely below 2%. The trend was broadly getting worse up to restructuring.

7.11 Post restructuring, lost mileage has reduced on all routes with the most recent years data showing the best score in seven years for every route except the 135. Route 135 has nevertheless achieved a significant improvement from an atrocious performance of almost 10% of service not operated in 2015/16.

Summary and interpretation

- 7.12 Both measures of reliability show poor performance prior to the service restructurings. This is especially so for the two years prior to the restructurings. 2015 saw particularly poor punctuality and 2016 very high lost mileage.
- 7.13 This coincides with the roadworks to upgrade CS2 that commenced in February 2015 and the Aldgate gyratory removal which began in January 2015. Both schemes have made significant improvements to the urban realm and to cycling provision. However their construction took around 2 years to build and had a significant impact on the wider Tower Hamlets road network. All the routes studied either pass down roads affected by the roadworks and/or went across them and so were directly affected. However they were also indirectly affected by the wider impact of displaced traffic and traffic management measures.
- 7.14 Post restructuring, EWT and lost mileage has improved significantly with the most recent year often representing the best performance for many years.
- 7.15 It appears highly likely that service provision and quality has been a significant factor in explaining the loss of patronage prior to the restructurings and the growth in usage since.
- 7.16 Whether the restructuring is responsible for the improved performance is not obvious. Although the improved service performance occurred following the restructuring, this is true also for the non-restructured routes. The end of the roadworks is likely to be a better explanation. However, the route restructuring has had no detrimental impact on the ability of each route to operate to its minimum performance standard in terms of EWT or to operate around 98% of its scheduled service. This is of note especially for routes D8 and 108 where responses to the consultation understandably expressed concern for the ability for routes to operate reliably.

8 CHANGE IN BUS SPEEDS AT THE ROUTE LEVEL

Data and Methodology

- 8.1 Together with reliability and operated mileage, bus speeds are another important indicator of service quality. At the network level there has been a correlation between slower bus speeds and bus use.
- 8.2 Bus speeds are measured by the ibus system. Data showing average speeds for the AM peak have been interrogated for each year going back to 2012/13. Although speeds will typically be slower in the late afternoon and PM peak and quicker at all other times when compared to the AM peak, the morning does give what many will consider a typical journey time. The data presented in table 20 is the average for weekdays across a year including school holidays and dwell time at bus stops and is expressed in miles per hour (mph).

Analysis

Route	201236 to 201335	201336 to 201435	201436 to 201535	201536 to 201635	201644 to 201742	201743 to 201843
108	12.3	12.2	11.4	11.1	10.6	10.5
D8	11.7	11.1	10.7	10.8	11.6	11.2
135	10.0	9.6	9.2	8.7	9.4	9.2
277	10.1	10.2	10.0	9.9	9.8	9.6
D3	10.2	9.5	9.1	8.6	8.2	8.2
D6	9.8	9.6	9.3	9.7	9.8	9.5
D7	12.4	12.0	11.8	11.3	11.3	11.2

Table 20: Average Annual Weekday AM Peak Bus Speeds 2012/13 – 2017/18 (mph).

- 8.3 Prior to the service changes there was a trend of declining bus speeds on all routes except the D6. This trend has continued following the restructuring for routes 108, 277, D3 and D7. Routes D8 and 135 saw an initial, significant, improvement in the first year following their restructuring followed by a reduction in the second year. However, these latest speeds are still faster than in the year prior to the restructurings.

8.4 The switching of the 108 and D8 routeings seems to have translated into a speed switch as well. This probably reflects the higher speeds on the A12 corridor compared to the Campbell Road corridor.

Summary and interpretation

8.5 The broad trend is one of reducing speeds both before and after the restructuring of the services – at least in the AM peak.

8.6 This makes this dataset different from the others. As with the other datasets, the story is one of deterioration prior to autumn 2016. However whereas the other datasets have shown an improvement since, bus speeds have not. This could be a consequence of the highway schemes identified taking capacity out of the road network permanently or it could be due to bus schedules being too cautious in the time allowed for buses to travel the length of the route. There is a connection between lower speeds and improved EWT although this would also be true if the schedule was an accurate reflection of road traffic conditions. However despite poorer bus speeds and therefore slower passenger journey times, usage has grown.

9 SUMMARY AND CONCLUSIONS

Summary

- 9.1 The review has compared before and after data for various indicators following the restructuring of routes 108, D8, 135, 277 and D3. It has also included unchanged routes D6 and D7 in the analysis as these complete the daytime routes that serve the Isle of Dogs.
- 9.2 In broad terms the outcomes following the autumn restructuring have been positive. Most fundamentally usage has grown by over 8% from the year immediately preceding the service change whereas on the unchanged D6 and D7, there has been zero growth. Service quality has also improved. Over 98% of mileage is now being operated compared to 95 – 96% previously and operated more reliably.
- 9.3 The story is not wholly positive. Usage per mile operated is not much altered from what it was immediately prior to the route restructurings in 2015/16 although the unchanged routes have continued to see a reduction. Bus speeds have generally continued to decline meaning longer journey times for passengers. Usage on the restructured parts of the routes often seems to have increased but some of the new travel opportunities afforded by the restructurings have yet to take off. Finally it appears that routes D3 and D7 have excess capacity in the peak hour.
- 9.4 What also emerges from the analysis is that something significant happened to the bus routes studied in the 2 years prior to the restructuring. Although the picture was mixed prior to 2014/15, pretty much every indicator nosedived during the next two years. Most notably usage declined by over 10% in those two years which equates to the bus network carrying around 55,000 less passenger trips per week. In addition, lost mileage was often in excess of 4% and almost 10% on route 135.

Conclusions

- 9.5 The generally positive outcomes following the restructuring prompt explanations. Singling out any specific explanation is always problematic given the enormous variety of factors that can influence bus travel. The geographically constrained area of the Isle

of Dogs (primarily due to the river) provides a better study area than most by reducing the 'noise' of some of these factors. However, it does not fully drown out the noise. Since autumn 2016 the routes studied have been altered further and affected by daily events on the highway network, not to mention old land uses changing function or being demolished and replaced with new versions. And the geographic features of the study area have little relevance to macro influences like the economy.

9.6 However possible explanations for the general improvement seen in the restructured routes since autumn 2016 are:

- **Restructuring**

9.7 The redesign of the local bus network is an obvious explanation given the focus of the study and has some merit. There is a fairly close match in timescales between the service changes and the increase in usage once a time lag of 8 – 12 months is taken into account. The time lag might be expected since those passengers most disrupted by the restructuring would cease using the bus network with almost immediate effect, whereas it takes longer for new passengers who would benefit from the scheme to become aware of this and adopt new travel patterns. The D3 might be a good example of this with a 50% reduction in passengers in the first year after restructuring but a 12% growth in the second year as the re-routeing via Blackwall Way (which eventually occurred in 2017 week 17) enabled existing developments south of Aspen Way to make use of the bus network.

9.8 Another argument in favour of this explanation is that the unchanged D6 and D7 routes have seen no growth in usage.

9.9 A weakness in the explanation is that at the micro level the evidence is not as strong as it could be. It looks like travel to and from the A12 and Campbell Road corridors has increased suggesting the new routeings have proved popular as has travel to and from many destinations within the study area. However travel to and from the Isle of Dogs, Canary Wharf and Stratford has not particularly increased. This may be down to the restructuring not being sufficiently attractive to bus users or it may be down to local

issues like the Stratford gyratory works or even the relatively small data sample. Another weakness is the apparent drop in peak hour demand on key corridors.

9.10 The extent to which the restructuring can explain the improvement in reliability and lost mileage is probably not strong and due to other reasons. However what is apparent is that the new route structures can still be operated to a high quality.

• **New Development / Population Growth**

9.11 The increase in passenger usage might simply be explained by new development opening along the restructured routes. Certainly developments like Bow Enterprise Park near Devons Road; new housing and the expansion of Bow school on the A12; the occupation of London City Island and various developments in the Isle of Dogs and Stratford have occurred on the restructured routes and must be a factor in increased bus travel. However, it cannot be the entire explanation since route D7 parallels the D8, 135 and 277 in its entirety and has seen zero growth since 2016. Further, new development has been built and occupied throughout the period 2011/12 and 2015/16 yet bus demand generally fell.

• **Fares**

9.12 Fares were frozen in 2016 after 8 years of increases and the introduction of the bus hopper fare in September 2016 effectively made some bus trips cheaper by removing the cost of interchanging within an hour. Therefore there is a strong correlation in timescales between fare changes and the growth in patronage. This would explain growth in background travel demand e.g. the stabilisation of usage on routes D6 and D7. However the fare change has a network wide implication and so would not obviously explain why growth in usage is so uneven across bus routes.

• Other Modes

9.13 Competition from other modes influences bus travel demand. Of particular relevance to the study area is the DLR. Between 2011/12 and January 2015 there was no change in service provision in terms of frequency or size of trains. During this period the DLR provided an hourly capacity provision of 6,498 between Lewisham and Bank; 2,166 between Lewisham and Stratford and 1,444 between Canary Wharf and Stratford. However, in January 2015 frequencies increased by 2.5 trains per hour (tph) between Lewisham and Stratford but using 2 rather than 3 carriage trains. Consequently carrying capacity remained 2,166. The frequency also increased by 2.5 tph between Canary Wharf and Stratford meaning an increase in capacity from 1,444 to 2,166 spaces per hour.

9.14 A graph showing DLR boarders between Island Gardens and Stratford is provided in appendix A3. It shows usage growing following the improvement in train frequency. This might explain the big reduction in bus demand seen prior to autumn 2016 as bus passengers switched to the more attractive DLR. However it would not explain the increase in bus use following the autumn 2016 restructurings.

• Service Provision and Quality

9.15 The level of the bus service provision and its quality would also influence bus demand. It seems highly likely that the big reduction in bus demand prior to autumn 2016 is due to 4 – 5% of the service not being provided. The poor EWT scores mean that the service being provided was subject to uneven headways and therefore a longer than average wait at the bus stop. Taken together this implies that buses were being curtailed short of their destination in order to try and even out the service and reduce bunching. Given the geography, the Isle of Dogs represents the end of the route for most of the services studied. Consequently service was being lost in a key area generating bus travel. Finally, once on a bus, passengers would find their journey times taking longer due to slower bus speeds.

- 9.16 It seems plausible that this was as much of a factor that pushed trips onto the DLR as were the DLR improvements themselves being a factor in attracting new passengers.
- 9.17 The reduction in service provision and quality was almost certainly connected to the road works on the CS2 upgrade and Aldgate gyratory removal that substantially improved provision for cyclists and the urban realm more generally. These works began in early 2015 and took around 2 years. All the routes studied crossed the roadworks and/or operated along their length for part of their journey.
- 9.18 The increase in usage post autumn 2016 might therefore simply be down to more service being provided and more reliably since the end of the roadworks. If so, it is promising that improvements to cycling and urban realm once constructed are not having a permanent effect on bus usage. This is despite the available highway capacity for buses being permanently reduced which might explain why bus speeds have not significantly improved. A weakness with this argument is the difference in usage change between the restructured routes and the unchanged routes since usage on the D6 and D7 has only stabilised and not grown.
- 9.19 From the above it seems likely that the restructuring of the bus services and the performance of the road network have been the biggest influences on what has happened to the Isle of Dogs bus network since 2011/12 but not the only factors.

Next steps

- 9.20 In line with the 2019 bus strategy, bus services will continue to be kept under review. In particular will be a need to consider peak hour bus provision on routes D3 and D7; investigate whether the D8 routing can be made more direct and support highway interventions that protect buses from delay e.g. the proposed bus gate within Wapping.

APPENDIX A1 – SERVICE CHANGE LIST

Full list of service changes by route from October 2016 to September 2018 inclusive.

Route	Date	Service Change
108	29/10/2016- 15/12/2016	<p>Temporary closure of Millennium Way, North Greenwich</p> <p>Towards Lewisham, buses are not affected and will remain on normal line of route.</p> <p>Towards Stratford Bus Station, buses will be diverted from North Greenwich Bus Station, via Edmund Halley Way, Pilot Bus Way, John Harrison Way and Blackwall Lane to normal line of route.</p>
	13/05/2017	<p>Introduction of a reliability scheme which increased run times using an additional peak bus Monday to Friday peaks; interpeaks and weekends. PVR +1</p>
	21/05/2017- 28/07/2017	<p>As part of the planned Blackwall Tunnel works, it was temporarily restructured to operate from Stratford to Canning Town and North Greenwich to Lewisham (both directions) between 0000 and 0800 hours.</p>
	05/12/2017- 19/01/2018	<p>Blackwall Tunnel southbound will be closed from 5th December for approximately 6 weeks from Tuesday to Thursdays 2359 to 0500hrs.</p> <p>From line of route on Chrisp Street, left East India Dock Road, ahead to the off slip (Barking Road) at Newham Way, circumnavigate the roundabout under the flyover to Canning Town Bus Station</p>
	19/05/2018- 20/05/2018 07/07/2018- 22/07/2018	<p>Introduction of enhanced service between Stratford and North Greenwich, in association with the suspension of the DLR.</p>

Route	Date	Service Change
135	01/10/2016	Removal of widened schedules to mitigate works within the Road Modernisation Plan (RMP). PVR -1
	30/01/2017-10/03/2017	Introduction of a diversion associated with the temporary closure of Holywell Lane.
	07/11/2017-22/12/2017	Towards Crossharbour, buses will be diverted from Old Street to Shoreditch High Street and normal line of route. Buses towards Old Street are unaffected and will remain on normal line of route.
277	25/02/2017	New contract, under Tranche 552, retained by Stagecoach. No change to frequencies.
	22/12/2017-07/01/2018	TfL will be carrying out work to replace the bridge at Highbury and Islington Station. The work will be carried out under two phases, this phase will involve a closure of Holloway Road, a closure of the west and north arms of Highbury Corner Gyratory.
	21/05/2018-29/06/2018	
	12/05/2018	New schedule to improve reliability (Friday nights and Saturday nights only)
	21/05/2018-01/07/2018	Introduction of a diversion associated with junction improvement works in Cassland Road.
	30/06/2018	Route withdrawn between Dalston Junction Bus Station and Highbury Corner and restructured to operate between Dalston Junction Bus Station and Crossharbour, Asda. The route ceases to be a 24 hour operation and the new N277 will operate between Crossharbour and Angel Islington. From Highbury Corner buses would serve Upper Street, Pentonville Road and Baron Street to stand at White Lion Street. Buses would return via Upper Street.
D3	29/04/2017	Re-routeing via Blackwall Way and Orchard Place. Buses will

Route	Date	Service Change
		set down and pick up on the stand in Orchard Way.
	11/11/17	New schedules with increased running time to improve reliability on all days.
	30/08/2018-30/11/2018	Closure of Blackwall Way
D6	02/12/2017-10/08/2018	Long-term closure of stop 2280 in Cambridge Heath Road towards Crossharbour, owing to development work.
	15/09/2018	New Quality Incentive Contract, under tranche 608, awarded to CT Plus (previously Docklands). No change to structure or frequency.
D7	15/09/2018	It is proposed to introduce new schedules with improved driver duties. This results in a redistribution of run time Monday to Sunday with minor changes to the public timetable
D8	15/09/2018	New Quality Incentive Contract, under tranche 608, awarded to Tower Transit (previously Docklands). Rerouted at Stratford to serve Stratford high Street and Great Eastern Road to enter and exit the bus station, instead of via The grove and Broadway.

APPENDIX A2: BODS SURVEY Routes 108 and D8

Route 108 surveyed on 06/03/18

Route D8 surveyed on 22/09/17

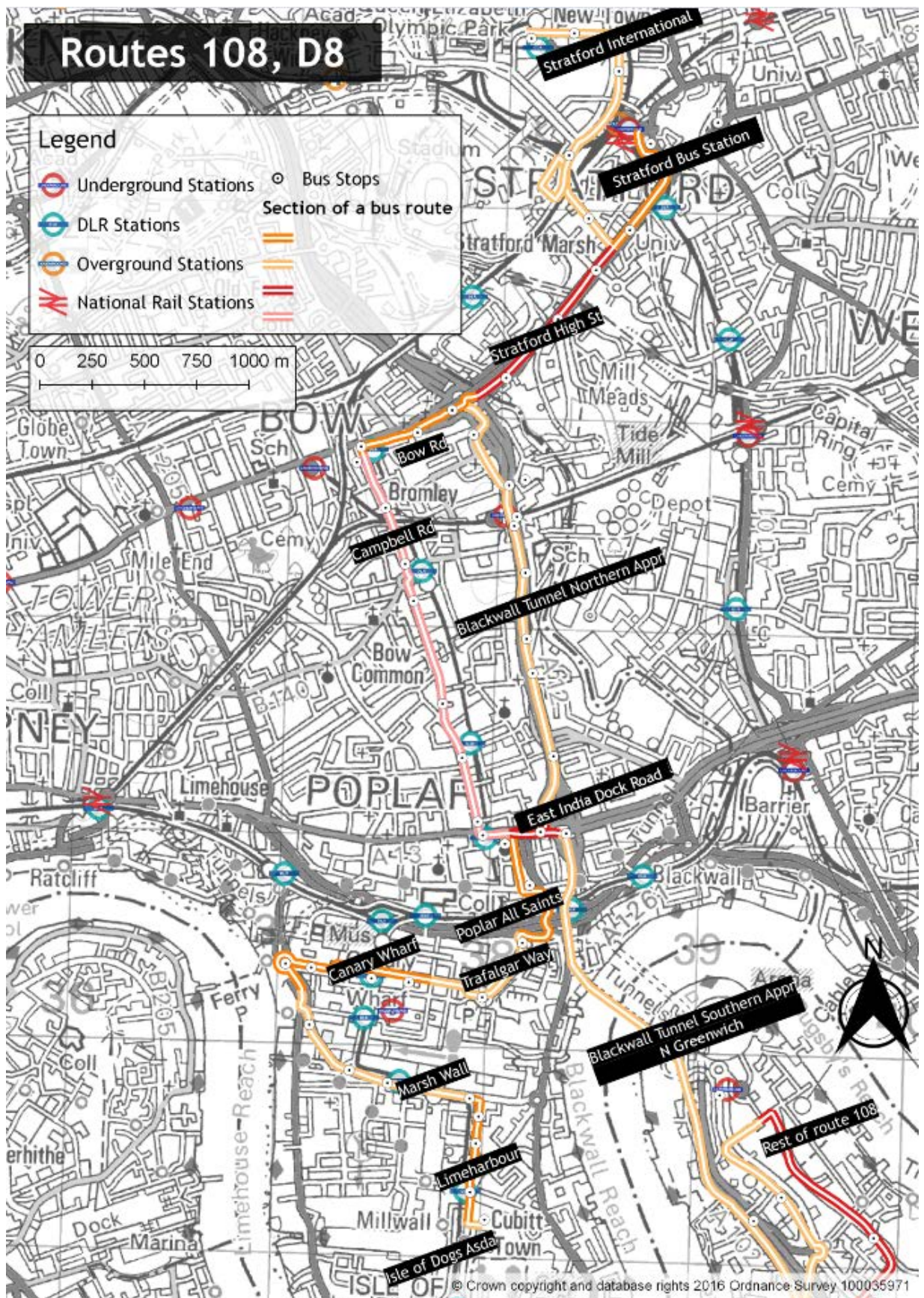
Journeys in the following time bands were used : 0000-3200																	
BOTH DIRECTIONS																	
Route: 0108 Dir: 1 Route: 00D8 Dir: 1 Route: 0108 Dir: 2 Route: 00D8 Dir: 2																	
Trips: 5993 Trips: 2371 Trips: 6553 Trips: 2194																	
TOTAL	ZONE		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
137	1	Stratford International	137	0	0	0	0	0	0	0	0	0	0	0	0	0	0
319	2	Stratford High Street	319	0	0	0	0	0	0	0	0	0	0	0	0	0	0
372	3	Bow Road	309	48	15	0	0	0	0	0	0	0	0	0	0	0	0
3015	4	Campbell Road	944	101	946	1024	0	0	0	0	0	0	0	0	0	0	0
202	5	Poplar Blackwell Tunnel	40	22	58	83	0	0	0	0	0	0	0	0	0	0	0
1162	6	Blackwall Tunnel Southern Approach	153	100	152	371	70	316	0	0	0	0	0	0	0	0	0
7354	7	Rest of route 108	295	64	178	262	98	3200	3257	0	0	0	0	0	0	0	0
761	8	Stratford Bus Station	0	487	139	0	18	0	0	117	0	0	0	0	0	0	0
1398	9	Blackwall Tunnel Northern Approach	0	111	115	0	15	0	0	742	415	0	0	0	0	0	0
581	10	Poplar All Saints	0	21	22	0	4	0	0	201	332	1	0	0	0	0	0
281	11	Trafalgar Way	0	24	6	0	5	0	0	56	94	79	18	0	0	0	0
391	12	Canary Wharf	0	24	0	0	0	0	0	62	121	130	33	21	0	0	0
593	13	Marsh Wall	0	13	4	0	10	0	0	99	92	167	50	157	1	0	0
244	14	Limeharbour	0	11	8	0	8	0	0	84	42	33	6	37	15	0	0
300	15	Isle of Dogs Asda	0	4	5	0	0	0	0	90	49	53	7	50	39	3	0
17111	0		2198	1030	1647	1739	228	3516	3257	1451	1146	463	113	265	55	3	0

Route 108 surveyed on 04/06/15

Route D8 surveyed on 14/10/13

Journeys in the following time bands were used : 0000-3200																
BOTH DIRECTIONS																
Route: 00D8 Dir: 1 Route: 0108 Dir: 1 Route: 00D8 Dir: 2 Route: 0108 Dir: 2																
Trips: 2428 Trips: 5161 Trips: 2670 Trips: 5462																
TOTAL	ZONE		1	2	3	4	5	6	7	8	9	10	11	12	13	14
2	1	Stratford International	2	0	0	0	0	0	0	0	0	0	0	0	0	0
169	2	Stratford High Street	165	4	0	0	0	0	0	0	0	0	0	0	0	0
303	3	Bow Road	235	61	7	0	0	0	0	0	0	0	0	0	0	0
2342	4	Campbell Road	793	100	728	722	0	0	0	0	0	0	0	0	0	0
426	5	Poplar All Saints	127	13	87	186	12	0	0	0	0	0	0	0	0	0
83	6	Trafalgar Way	22	0	14	35	10	3	0	0	0	0	0	0	0	0
519	7	Canary Wharf	39	22	32	210	98	86	31	0	0	0	0	0	0	0
514	8	Marsh Wall	101	22	77	150	45	11	101	7	0	0	0	0	0	0
261	9	Limeharbour	39	21	31	78	30	4	47	10	1	0	0	0	0	0
504	10	Isle of Dogs Asda	58	12	31	215	81	1	36	69	1	0	0	0	0	0
966	11	Stratford Bus Station	0	524	161	0	0	0	0	0	0	0	281	0	0	0
1244	12	Blackwall Tunnel Northern Approach	0	49	175	0	0	0	0	0	0	0	656	364	0	0
1146	13	Blackwall Tunnel Southern Approach	0	38	53	0	0	0	0	0	0	0	493	361	200	0
7243	14	Rest of route 108	0	65	71	0	0	0	0	0	0	0	757	319	3192	2840
15721	0		1580	930	1467	1597	276	105	214	86	2	0	2188	1044	3391	2840

APPENDIX A2: Details of the zoning used for the BODS SURVEY Routes 108 and D8



APPENDIX A2: BODS SURVEY Routes 135, 277, D3 and D7

Route 135 surveyed on 01/11/17

Route 277 surveyed on 14/09/17

Route D3 surveyed on 20/11/17

Route D7 surveyed on 30/10/17

Journeys in the following time bands were used : 0000-3200																			
BOTH DIRECTIONS																			
Route: 0135 Dir: 1		Route: 0277 Dir: 1		Route: 00D7 Dir: 1		Route: 00D3 Dir: 1		Route: 0135 Dir: 2		Route: 0277 Dir: 2									
Trips: 6276		Trips: 12169		Trips: 6000		Trips: 3407		Trips: 6512		Trips: 12340									
Route: 00D7 Dir: 2		Route: 00D3 Dir: 2																	
Trips: 6961		Trips: 3337																	
TOTAL	ZONE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
0	1 Isle of Dogs Asda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	2 Limeharbour North + Marshwall	23	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1269	3 Manchester Road	213	162	894	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
159	4 Spindrift Avenue	51	19	78	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2332	5 Westferry Road	305	30	1275	216	505	0	0	0	0	0	0	0	0	0	0	0	0	0
6027	6 Canary Wharf	91	27	712	200	4879	118	0	0	0	0	0	0	0	0	0	0	0	0
916	7 West India Dock Road	13	2	50	2	281	549	18	0	0	0	0	0	0	0	0	0	0	0
890	8 Commercial Road Limehouse	22	2	34	40	125	456	102	110	0	0	0	0	0	0	0	0	0	0
8271	9 Rest of route 135	97	52	277	76	854	953	419	1634	3908	0	0	0	0	0	0	0	0	0
2024	10 Poplar All Saints	0	0	1598	0	329	66	2	0	0	29	0	0	0	0	0	0	0	0
813	11 Prestons Road	0	0	431	0	106	25	1	0	0	243	6	0	0	0	0	0	0	0
1082	12 Blackwall Way / Saffron Ave	0	0	0	0	0	649	115	71	0	0	0	247	0	0	0	0	0	0
497	13 Trafalgar Way	0	0	0	0	0	75	13	16	0	0	0	351	42	0	0	0	0	0
33	14 South Limeharbour	6	0	0	2	17	8	0	0	0	0	0	0	0	0	0	0	0	0
2604	15 South Westferry Road	172	0	332	34	408	1300	43	0	0	231	44	0	0	15	25	0	0	0
25341	16 Rest of route D7 / 277	205	0	310	57	1302	3826	1292	0	0	61	15	0	0	17	359	17897	0	0
4717	17 Rest of route D3	0	0	0	0	0	335	77	538	0	0	0	165	47	0	0	0	3555	0
57003	0	1197	300	5991	639	8806	8360	2083	2369	3908	564	66	763	89	32	384	17897	3555	0

Route 135 surveyed on 25/02/13

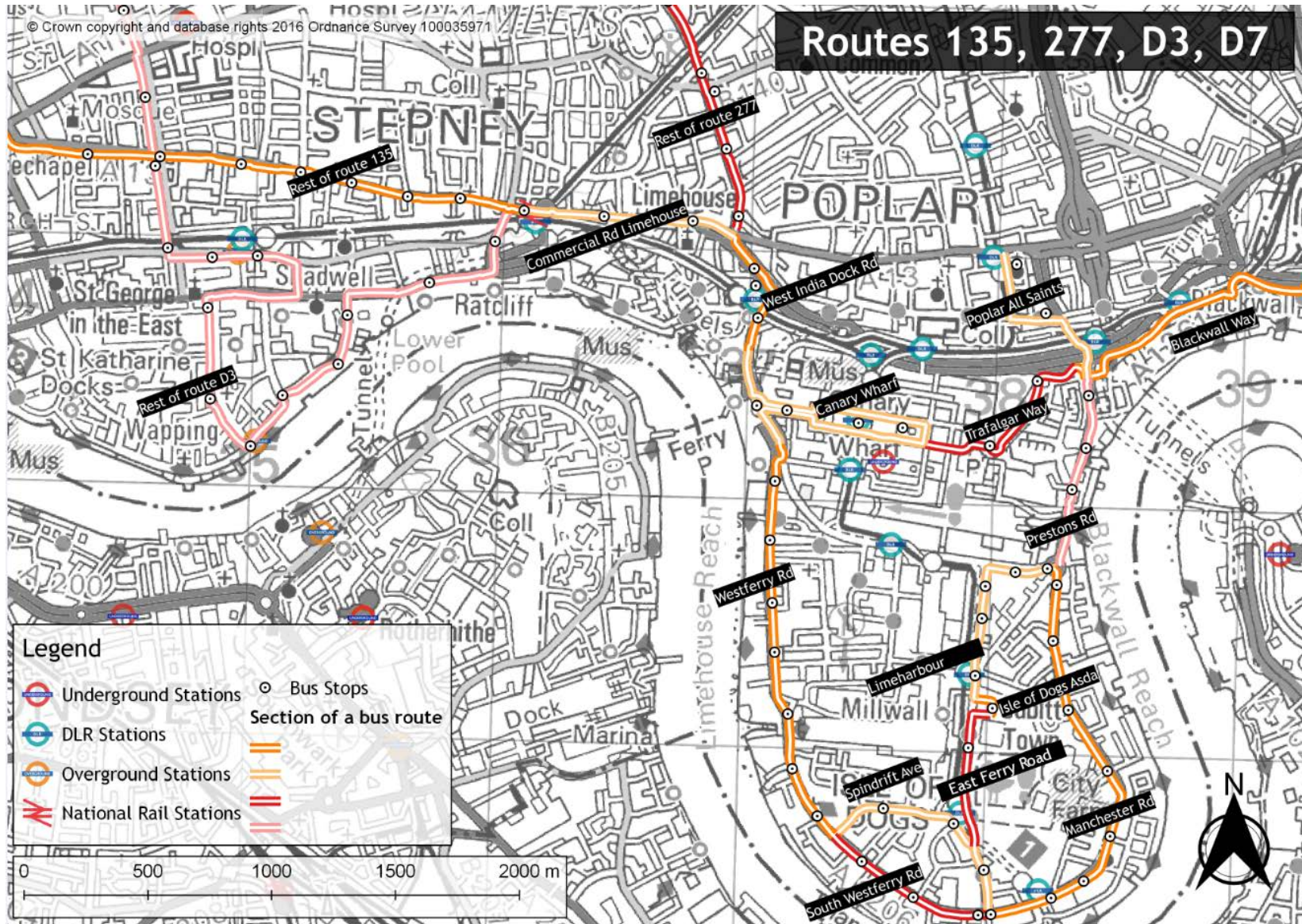
Route 277 surveyed on 12/09/13

Route D3 surveyed on 22/10/13

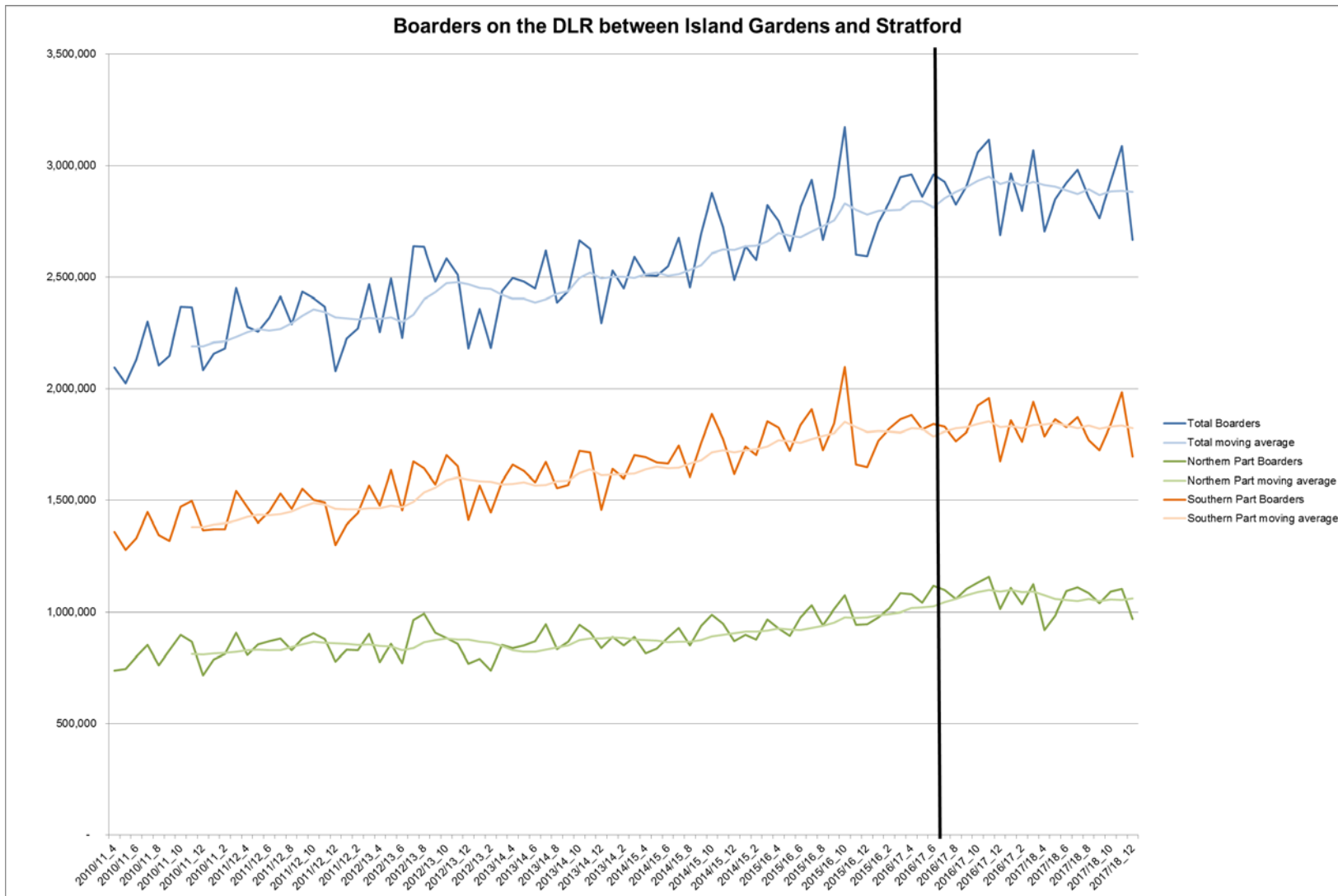
Route D7 surveyed on 04/11/13

Journeys in the following time bands were used : 0000-3200																			
BOTH DIRECTIONS																			
Route: 00D3 Dir: 1 Route: 0135 Dir: 1 Route: 00D7 Dir: 1 Route: 0277 Dir: 1 Route: 00D3 Dir: 2 Route: 0135 Dir: 2																			
Trips: 4012 Trips: 6137 Trips: 6019 Trips: 10533 Trips: 3866 Trips: 6162																			
Route: 00D7 Dir: 2 Route: 0277 Dir: 2																			
Trips: 7211 Trips: 10044																			
TOTAL	ZONE	Name	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
2592	1	Rest of route D3	2592	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
587	2	Commercial Road Limehouse	475	112	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
190	3	West India Dock Road	122	51	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1437	4	Canay Wharf	376	364	444	253	0	0	0	0	0	0	0	0	0	0	0	0	0
6293	5	Westferry Road	288	234	408	4920	442	0	0	0	0	0	0	0	0	0	0	0	0
363	6	Spindrift Avenue	44	20	8	191	95	6	0	0	0	0	0	0	0	0	0	0	0
3136	7	Manchester Road	193	104	92	1038	970	67	672	0	0	0	0	0	0	0	0	0	0
264	8	Limeharbour North + Marshwall	31	10	5	12	57	9	127	14	0	0	0	0	0	0	0	0	0
1049	9	Isle of Dogs Asda	63	53	40	156	348	87	278	23	0	0	0	0	0	0	0	0	0
23888	10	Rest of route 277/D7	0	0	1285	3684	758	0	460	0	0	17701	0	0	0	0	0	0	0
7551	11	Rest of route 135	0	1555	387	1033	809	21	0	0	291	0	3454	0	0	0	0	0	0
400	12	Trafalgar Way	0	0	6	186	0	0	0	0	0	207	0	1	0	0	0	0	0
633	13	Blackwall Way / Saffron Ave	0	0	11	244	0	0	0	0	0	354	0	24	1	0	0	0	0
3075	14	South Westferry Road	0	30	92	1563	404	11	289	0	208	191	280	0	0	7	0	0	0
47	15	South Limeharbour	0	0	0	9	13	0	0	0	3	0	9	0	0	13	0	0	0
387	16	Prestons Rd	0	0	7	28	69	0	225	0	0	20	0	0	0	36	0	3	0
2092	17	Poplar All Saints	0	0	13	84	329	0	1306	0	0	101	0	0	0	161	0	88	10
53984	0		4183	2533	2815	13401	4293	202	3358	37	502	18573	3743	25	1	217	0	91	10

APPENDIX A2: Details of the zoning used for the BODS SURVEY Routes 135, 277, D3 and D7



APPENDIX A3: DLR Borders between Island Gardens and Stratford



In January 2015 frequencies on the DLR through the Isle of Dogs were increased. The black line marks the date the bus services were restructured.