Report
December 2023

Station Usage & Origin Destination Matrix 2022/23: Historical Methodological Changes

Office of Rail and Road
Our ref: 24384901
Client ref:

steer

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Prepared by:

Steer
14-21 Rushworth Street
London SE1 0RB

+44 20 7910 5000
www.steergroup.com

Prepared for:

Office of Rail and Road
25 Cabot Square
London
E14 4QZ
Client ref:
Our ref: 24384901

steer

Contents

Figures

Tables

1 Methodological changes 2011/12 – 2022/23

1.1 This section summarises the methodological changes specified and implemented in the Station Usage dataset by Steer from the 2011/12 to 2022/23 dataset. The descriptions of the methodological changes in this section were originally included in the Station Usage Methodology and Validation reports for those years' datasets.

Methodological Changes in 2022/23

PTE Infill Changes for 2022/23

1.2 Each year, PTE infills are prepared by Steer (West Midlands) and Mott MacDonald (Greater Manchester, Merseyside, South Yorkshire, Tyne and Wear, West Yorkshire, Strathclyde).

1.3 These infills are subject to annual improvements, which normally represent a simple update, but some years contain a step change in the methodology.

Greater Manchester - update to concessionary demand methodology

1.4 In the 2022/23 dataset, the methodology for calculating concessionary demand in the Greater Manchester region has been updated. A new data source was available (rail surveys undertaken in August 2023) which covered all ticket types (including concessions on radial Manchester rail routes). This data can be used to estimate the proportion of concessions across all other ticket types – this in turn can then be used to update the assumptions used to uplift the Greater Manchester infill (non-concessionary demand) to account for concessionary travel that would otherwise not be covered by the ticket purchase data.

1.5 This update is also an improvement to overall demand estimates because the previous assumption was derived from surveys conducted in March 2017 i.e., pre-pandemic. It is likely that the amount of concessionary travel has changed between 2017 and 2023, due to general changes to travel patterns and as older passengers have tended to return to rail travel more slowly following the pandemic.

1.6 The new data suggests that 6% of all ticket types are concessions (compared to 13% previously). This methodology change accounts for a decrease of **0.75m** journeys (1.5m entries & exits) in the Greater Manchester PTE area in 2022/23, which equates to a 2.3% decrease in total entries and exits across the Greater Manchester PTE area (inclusive of RSP tickets).

West Yorkshire – updated distribution

1.7 In 2020/21, a new distribution was used for allocating the journeys on West Yorkshire PTE products to specific flows. 2019/20 MCard smartcard data was used, replacing the out-of-date 2013/14 WYCA fares survey data. The MCard data covers 80% of passengers travelling to 80% of stations and is more suited to demand modelling. It consists of raw tap-in/tap-out data

covering all time periods and contains 15,000 smartcards, specified by PTE ticket type, which are assigned to an origin station based on postcode.

1.8 In 2021/22 this MCard distribution was updated by using 2021/22 data (replacing the pre-pandemic 2019/20 data), better reflecting post-pandemic travel patterns. The sample size was also greater than the 2019/20 data, covering a full year rather than one week.

1.9 In 2022/23 this MCard distribution was updated again by using 2022/23 data, to best reflect the most recent travel patterns, including continue post-pandemic recovery. This data covers the whole year with the same sample size as 2021/22.

1.10 As per the previous years, the new distribution was evaluated for each station, with a threshold set to adjust a small number of anomalous results using ratios based on the distribution used in previous years and RSP (LENNON) data.

1.11 This methodology change does not affect the total number of journeys included in the infill, but it does impact their distribution across the network. The main conclusion is that recovery is continuing post-pandemic in line with wider trends, with just a few stations experiencing decreases in usage year-on-year due to changes in service provision (Denby Dale) and engineering works (Dewsbury, Huddersfield).

Season ticket journey adjustments

London

1.12 In the production of previous years' statistics, adjustments were made to account for passengers who buy season tickets for travel to/from a station other than the one they generally travel from, providing additional travel flexibility. This issue, and the previous adjustments, are described in detail in the accompanying report, '*Station Usage & Origin Destination Matrix 2022/23: Historical Methodological Changes*'.

1.13 In some areas, multiple stations have identically priced season tickets to London. As a result, London season tickets are generally sold as being from the furthest station, regardless of the actual origin of travel, giving the passenger additional flexibility for no increase in fare. This means that the ticket sales data shows that there are more people travelling to/from this station than is the case.

1.14 LENNON sales data was used to estimate the number of tickets where the issuing office (the location at which the season ticket is obtained by the customer) was at a branch line station, but the ticket origin showed a station further along the line. For the ten flows with the highest absolute number of ticket journeys being issued from stations different to the ticket origin, it was assumed that the true origin of the journeys was the issuing location, and not the recorded origin.

1.15 For the production of the 2022/23 statistics, the analysis underpinning this reallocation was updated with 2022/23 LENNON data. Table 1.1 shows the scale of the adjustments.

Table 1.1: Summary of London season ticket adjustments in 2022/23

Station TLC	Station Name	Station Group	Adjusted Entries & Exits	Total Entries & Exits
SOV	Southend Victoria	Southend Victoria Branch	-162,910	1,261,540
HOC	Hockley	Southend Victoria Branch	54,131	770,184
RLG	Rayleigh	Southend Victoria Branch	78,641	1,332,392
RFD	Rochford	Southend Victoria Branch	30,138	574,674
OXF	Oxford	Oxford/Didcot Parkway	-59,123	6,581,606
DID	Didcot Parkway	Oxford/Didcot Parkway	59,123	2,329,704
UCK	Uckfield	Uckfield	-26,426	200,272
BXD	Buxted	Uckfield	4,488	92,856
COH	Crowborough	Uckfield	21,937	227,138
REI	Reigate	Reigate/Redhill	-23,878	1,004,608
RDH	Redhill	Reigate/Redhill	23,878	2,711,640
GLM	Gillingham (Kent)	Medway	-32,716	2,120,460
CTM	Chatham	Medway	12,779	2,010,328
RTR	Rochester	Medway	7,232	1,783,662
SOO	Strood (Kent)	Medway	12,704	990,098
BTR	Braintree	Braintree	-13,901	524,782
WTM	Witham	Braintree	13,901	1,617,780
EGR	East Grinstead	East Grinstead/Lingfield	-10,530	888,748
LFD	Lingfield	East Grinstead/Lingfield	10,530	353,316
GTW	Gatwick Airport	Gatwick Airport/Horley	-35,664	16,507,980
HOR	Horley	Gatwick Airport/Horley	35,664	1,033,666
RTR	Rochester	Rochester/Strood	-8,461	1,783,662
SOO	Strood (Kent)	Rochester/Strood	8,461	990,098
SOC	Southend Central	Southend Central Branch	-6,452	2,041,420
WCF	Westcliff	Southend Central Branch	6,452	920,720

Cardiff

1.16 In the stakeholder feedback and consultation as part of the production of the 2019/20 estimates of station usage, Transport for Wales (TfW) highlighted that there were several end-of-line or end-of-fare-zone stations that potentially have over-estimates of season ticket usage and corresponding under-estimates at preceding stations.

1.17 This is the same issue that the adjustment described above addresses for season ticket flows to/from London, so an equivalent methodology was developed for season ticket flows to/from Cardiff during the production of the 2020/21 estimates of station usage, with LENNON sales data being used to estimate the number of tickets where the issuing office is different to the origin station on the season ticket.

1.18 For the production of the 2022/23 statistics, the analysis underpinning this reallocation was updated with 2022/23 LENNON data. Table 1.2 shows the scale of the adjustments.

Table 1.2: Summary of Cardiff season ticket adjustments in 2022/23

Station TLC	Station Name	Station Group	Adjusted Entries & Exits	Total Entries & Exits
PPD	Pontypridd	Pontypridd/Trefforest	-7,921	536,050
TRF	Trefforest	Pontypridd/Trefforest	7,921	554,112
BYI	Barry Island	Barry	-17,845	367,594
BRY	Barry	Barry	8,121	452,024
BYD	Barry Docks	Barry	1,560	219,792
CAD	Cadoxton	Barry	8,164	258,164
ABE	Aber	Aber/Caerphilly	-2,093	103,976
CPH	Caerphilly	Aber/Caerphilly	2,093	524,900
SRR	Sarn	Sarn/Bridgend	-1,196	46,410
BGN	Bridgend	Sarn/Bridgend	1,196	1,133,284
LNB	Llanbradach	Llanbradach/Caerphilly	-992	49,924
CPH	Caerphilly	Aber/Caerphilly	992	524,900
TDU	Tondu	Tondu/Bridgend	-761	39,936
BGN	Bridgend	Tondu/Bridgend	761	1,133,284
RDR	Radyr	Radyr/Llandaf	-865	331,870
LLN	LLandaf	Radyr/Llandaf	865	316,534
HNG	Hengoed	Hengoed/Ystrad Mynach	-692	105,904
YSM	Ystrad Mynach	Hengoed/Ystrad Mynach	692	198,824
TRB	Treherbert	Treherbert/Pontypridd	-676	121,196
PPD	Pontypridd	Treherbert/Pontypridd	676	536,050
SWA	Swansea	Swansea/Neath/Port Talbot	-1,431	1,883,574
NTH	Neath	Swansea/Neath/Port Talbot	563	666,058
PTA	Port Talbot Parkway	Swansea/Neath/Port Talbot	868	471,848
PGM	Pengam	Pengam/Caerphilly	-813	189,282
CPH	Caerphilly	Pengam/Caerphilly	813	524,900
TRY	Treorchy	Treorchy/Pontypridd	-442	83,404
PPD	Pontypridd	Treorchy/Pontypridd	442	536,050
MST	Maesteg	Maesteg/Bridgend	-885	142,286
BGN	Bridgend	Maesteg/Bridgend	885	1,133,284
POR	Porth	Porth/Trefforest	-533	151,692
TRF	Trefforest	Porth/Trefforest	533	554,112
TAF	Taffs Well	Taffs Well/Radyr	-662	164,682
RDR	Radyr	Taffs Well/Radyr	662	331,870

1.19 This adjustment leads to a significant impact (>2%) at 3 of these stations (Barry Island, Sarn and Cadoxton).

Inclusion of Caledonian Sleeper tickets

1.20 MOIRA2.2 does not model overnight (sleeper) services, and therefore dedicated sleeper products are not included in the MOIRA2.2 base matrix used as the starting point for the estimates of station usage. The volume of tickets excluded from the MOIRA2.2 base matrix has increased in recent years, as the Caledonian Sleeper TOC has moved towards more 'all inclusive' tickets which include travel and accommodation (and can therefore be identified as sleeper tickets and removed from the matrix) rather than 'sleeper supplements' (which have no journeys assigned to them in LENNON) used in conjunction with tickets valid on daytime trains (which have no way of being identified as being used on sleeper services).

1.21 Therefore, in the processing of the 2020/21 statistics, an extra LENNON query was used to extract such Caledonian Sleeper tickets and these were incorporated into the statistics. For the

production of the 2022/23 statistics, this analysis was updated with 2022/23 LENNON data. This resulted in the addition of c. 198.5k journeys (397k entries and exits), with the vast majority at London Euston and stations in Scotland, as show in Table 1.3 below.

Table 1.3: Summary of additional Caledonian Sleeper entries and exits in 2022/23

Station TLC	Station Name	Total Entries & Exits	Entries & Exits Added	% Impact
EUS	London Euston	31,318,408	191,837	0.6%
EDB	Edinburgh	18,212,628	55,261	0.3%
GLC	Glasgow Central	20,767,954	42,929	0.2%
INV	Inverness	974,808	39,189	4.0%
FTW	Fort William	145,564	22,960	15.8%
ABD	Aberdeen	1,961,414	12,393	0.6%
AVM	Aviemore	112,090	4,385	3.9%
CRE	Crewe	2,922,754	3,490	0.1%
DEE	Dundee	1,453,560	2,967	0.2%
PTH	Perth	695,276	1,772	0.3%
LEU	Leuchars (For St. Andrews)	461,204	1,496	0.3%
PIT	Pitlochry	105,586	1,341	1.3%
WFJ	Watford Junction	5,536,096	1,076	0.0%
STG	Stirling	1,927,190	1,052	0.1%
PRE	Preston (Lancs)	4,236,536	1,039	0.0%
CNR	Crianlarich	13,370	965	7.2%
KGX	London Kings Cross	23,287,414	915	0.0%
DKD	Dunkeld & Birnam	38,416	828	2.2%
STN	Stonehaven	359,880	818	0.2%
GLE	Gleneagles	76,370	734	1.0%
HLU	Helensburgh Upper	9,320	693	7.4%
CAR	Carlisle	1,801,198	691	0.0%
MTH	Motherwell	699,220	689	0.1%
MTS	Montrose	243,796	671	0.3%
CRR	Corrour	14,108	670	4.7%
DBL	Dunblane	360,418	558	0.2%
Other stations (<500 E&Es added each)		n/a	5,210	n/a

Demand allocation at Group Stations (retained from previous years)

1.22 To validate and improve the allocation of journeys to/from stations within groups (e.g. Dorking BR), passenger counts are routinely carried out at selected group stations on the network. The most recent counts were carried out at a number of stations during Autumn 2022, with the following groups having their splits updated:

- Dorking BR
- Bootle BR
- Newark BR
- Wakefield BR
- Pontefract BR

1.23 These Autumn 2022 counts were used both to validate existing data, and to create or update station group counts splits, with five sets of station counts splits updated. The proportion of journeys split between stations based on routine counts are shown in Table 1.4 below, which were implemented in the production of the 2022/23 estimates of station usage.

Table 1.4: Count-based adjustments to 2022/23 statistics

Station Name	Station Group	Proportions	Year Undertaken
Colchester	COLCHESTER BR	85%	2013/14
Colchester Town	COLCHESTER BR	15%	2013/14
Bedford	BEDFORD BR	96%	2014/15
Bedford St Johns	BEDFORD BR	4%	2014/15
Farnborough (Main)	FARNBOROUGH BR	82%	2013/14
Farnborough North	FARNBOROUGH BR	18%	2013/14
Maidstone Barracks	MAIDSTONE BR	11%	2013/14
Maidstone East	MAIDSTONE BR	55%	2013/14
Maidstone West	MAIDSTONE BR	34%	2013/14
Portsmouth & Southsea	PORTSMOUTH BR	49%	2014/15
Portsmouth Harbour	PORTSMOUTH BR	51%	2014/15
Canterbury East	CANTERBURY BR	30%	2014/15
Canterbury West	CANTERBURY BR	70%	2014/15
Falkirk Grahamston	FALKIRK BR	44%	2014/15
Falkirk High	FALKIRK BR	56%	2014/15
Helensburgh Central	HELENSBURGH BR	98%	2014/15
Helensburgh Upper	HELENSBURGH BR	2%	2014/15
Southend Central	SOUTHEND BR	46%	2015/16
Southend Victoria	SOUTHEND BR	28%	2015/16
Southend East	SOUTHEND BR	26%	2015/16
Wigan North Western	WIGAN BR	52%	2015/16
Wigan Wallgate	WIGAN BR	48%	2015/16
Folkestone Central	FOLKESTONE BR	57%	2018/19
Folkestone West	FOLKESTONE BR	43%	2018/19
Hertford East	HERTFORD BR	51%	2018/19
Hertford North	HERTFORD BR	49%	2018/19
Guildford	GUILDFORD BR	88%	2018/19
London Road (Guildford)	GUILDFORD BR	12%	2018/19
Worcester Foregate Street	WORCESTER BR	77%	2019/20
Worcester Shrub Hill	WORCESTER BR	23%	2019/20
Dorchester South	DORCHESTER BR	83%	2019/20
Dorchester West	DORCHESTER BR	17%	2019/20
Warrington Bank Quay	WARRINGTON BR	51%	2019/20

Station Name	Station Group	Proportions	Year Undertaken
Warrington Central	WARRINGTON BR	49%	2019/20
Edenbridge (Kent)	EDENBRIDGE BR	35%	2019/20
Edenbridge Town	EDENBRIDGE BR	65%	2019/20
Deansgate	MANCHESTER BR	3%	2019/20
Manchester Oxford Road	MANCHESTER BR	13%	2019/20
Manchester Piccadilly	MANCHESTER BR	65%	2019/20
Manchester Victoria	MANCHESTER BR	19%	2019/20
Dorking (Deepdene)	DORKING BR	37%	2022/23
Dorking (Main)	DORKING BR	60%	2022/23
Dorking West	DORKING BR	3%	2022/23
Bootle New Strand	BOOTLE BR	56%	2022/23
Bootle Oriel Road	BOOTLE BR	44%	2022/23
Newark Castle	NEWARK BR	36%	2022/23
Newark North Gate	NEWARK BR	64%	2022/23
Wakefield Westgate	WAKEFIELD BR	79%	2022/23
Wakefield Kirkgate	WAKEFIELD BR	21%	2022/23
Pontefract Monkhill*	PONTEFRACT BR*	70%	2022/23
Pontefract Tanshelf*	PONTEFRACT BR*	30%	2022/23

1.24 *For the Pontefract station group, when the station counts were conducted in October 2022, there were no rail services at Pontefract Baghill (Northern had been forced to scale back services at this low usage station due to COVID-19-related staff absences). Therefore, no passengers were counted at this station, and a % split is not applied to reallocate demand at this station. This station is the smallest and least used out of the three Pontefract stations (accounting for only 4% of total demand to stations within the Pontefract BR station group in 2021/22). Therefore, it is unlikely to have an impact on the split of demand between the other two stations, with the counts results providing a good estimation of the demand split between them.

Updated Heathrow Station splits

1.25 To improve the allocation of demand between the 3 rail stations within Heathrow Airport (Terminals 2&3, Terminal 4 and Terminal 5) data was supplied by Heathrow. This data replaces the derived splits from LENNON data (see Appendix A, category 2) and is based on gateline data collected by Heathrow. This is a more accurate representation of the split of passenger usage at the 3 Heathrow rail stations, as it is derived from actual passenger movements rather than sales data. These updated splits were first included in the 2021/22 estimates of station usage and updated splits were supplied by Heathrow for use in the 2022/23 estimates.

London BR Allocations

1.26 One of the steps in allocating tickets that do not have a specified station origin or destination (see Category 3 in the Appendix) is to allocate flows that have 'London BR' as an origin or destination to an appropriate London station. In previous years, this has been done by utilising

survey data from the 2001 London Area Travelcard Survey (LATS) which was a comprehensive survey of travel in London, but is now limited by the fact that more recent infrastructure and service upgrades have altered demand patterns. For example, while many allocations to central London stations will be similar to when the LATS took place, some will have changed significantly (e.g., due to the impacts of the Thameslink Programme[1]).

1.27 A further limitation of the LATS data is that it was originally based on survey responses from travelcard users, and therefore there are some small allocations to stations outside of central London, reflecting its original use for allocating travelcard data. This does not fully reflect permissible travel using tickets to London BR.

1.28 For these reasons, a methodological enhancement was developed to utilise the data contained in the Central Allocations File (CAF) which is already used for producing the interchanges estimates in the Station Usage dataset. The CAF contains information on the proportion of passengers modelled to choose each possible route between station pairs, and also disaggregates by ticket type. It is also updated for each timetable change, so can take into account future service changes, thus future-proofing this new methodology.

1.29 This methodology change does not affect the total number of journeys, but it does impact their distribution across London stations. Stations which have experienced significant changes (>2%) due to this methodological enhancement are presented in Table 1.5 below. The impact of large schemes can be clearly seen in the stations with significant changes, and the removal of the Travelcard survey destinations where stations are not actually part of London BR can be seen in the stations with significant decreases.

Table 1.5: Stations with significant changes resulting from the London BR Allocation update.

TLC	Station Name	Impact	Notes
CST	Lonon Cannon Street	-22%	Impacts of Thameslink Programme
KGX	London Kings Cross	-19%	Impacts of Thameslink Programme
CHX	London Charing Cross	-15%	Impacts of Thameslink Programme
TOM	Tottenham Hale	-12%	Travelcard survey destination
VIC	London Victoria	-11%	Impacts of Thameslink Programme
WAE	London Waterloo East	-9%	Impacts of Thameslink Programme
FPK	Finsbury Park	-8%	Travelcard survey destination
VXH	Vauxhall	-3%	
FST	London Fenchurch Street	-3%	
ZFD	Farringdon	+5%	Impacts of Thameslink Programme
LBG	London Bridge	+11%	Impacts of Thameslink Programme
STP	London St Pancras International	+18%	Impacts of Thameslink Programme
CTK	City Thameslink	+31%	Impacts of Thameslink Programme
BFR	London Blackfriars	+53%	Impacts of Thameslink Programme

[1] **https://www.networkrail.co.uk/running-the-railway/railway-upgrade-plan/key-projects/thameslink-programme/**

Split Ticketing

1.30 Split ticketing has been a known limitation of rail industry data for many years. The complexity of the fares system in GB rail has led to opportunities where a combination of shorter-distance tickets can be combined to provide a cheaper fare than the advertised price for the end-to-end journey.

1.31 This is known within the industry as 'split ticketing' and, whilst there have been such opportunities for a number of years, prevalence increased towards the end of 2019/20. The split tickets are shown within LENNON as the individual journey components, and therefore within the base data indicate a greater number of shorter-distance journeys. This will suggest higher footfall at the intermediate stations where the tickets are 'split'. For the first time in 2022/23, an adjustment to the ODM has been developed to account for split ticketing.

1.32 The Rail Delivery Group (RDG) has developed an algorithm that can identify split ticketing in LENNON data and agreed to share the outputs and data extracts for use in developing this adjustment. The RDG data was used to estimate annual split journeys by flow in 2022/23 and therefore indicate the number of journeys on each flow that should be removed from the ODM due to split ticketing.

1.33 The data also enabled the 'correct' journey to be reinstated after this removal. For example, for a journey on flow A<>C with a split at B, the first step is to remove the A<>B and B<>C legs, and the second step is to replace with a journey on A<>C. This is because it is only the split at B that is creating artificial demand – LENNON has recorded 2 journeys (1 on each of A<>B and B<>C) but this was 1 journey on A<>C.

1.34 The split ticketing adjustment results in a net reduction of journeys in the ODM (due to the removal of artificial demand generated by split ticketing) of **18.6m** journeys (37.2m entries & exits) which equates to a c. 1.5% reduction in total entries and exits across the ODM.

Elizabeth Line

1.35 The opening of the 'central core' of the Elizabeth Line (previously known as Crossrail) in May 2022 has had a significant impact on the station usage dataset. This is a rail line with very high passenger usage, and therefore several of the stations served by the Elizabeth Line appear towards the top of the list of most used stations in 2022/23.

1.36 However, a complexity caused by the opening of the Elizabeth Line is that an existing issue within LENNON was highly exacerbated on the new flows involving Elizabeth Line stations. This is because one of the steps in LENNON is limited to integer journey inputs, however, the Elizabeth Line has generated a large number of route options for each flow, each with a decimal allocation of journeys. This leads to a 'rounding' up of the journeys on the affected flows, ultimately resulting in a significant overstatement of journeys on flows involving the Elizabeth Line in LENNON (and therefore also in the MOIRA2.2 base matrix).

1.37 Through discussions with industry colleagues at RDG, DfT, TfL and GBRTT, an alternative data source was provided by TfL. This data is a modelled number of daily journeys on the Elizabeth Line by flow, but based on TfL's tap data. Therefore, this was the best candidate for use in generating an adjustment to avoid significant overstatements of demand in the ODM and station usage dataset.

1.38 The TfL taps data was compared with appropriate LENNON data extracts in order to generate adjustment factors for each flow (based on the different estimates of journeys in the two data

sources), which were then applied to the rail legs of the LENNON flows. This enabled a calculation of how many journeys were likely overstated in LENNON (and therefore MOIRA) and enabled the ODM flows to be adjusted appropriately to remove the effects of this overstatement.

1.39 The Elizabeth Line adjustment results in a net reduction of journeys in the ODM (due to the removal of the overstated Elizabeth Line journeys generated by the LENNON issue) of **29.5m** journeys (58.9m entries & exits) which equates to a c. 2.3% reduction in total entries and exits across the ODM.

Methodological Changes in 2021/22

PTE Infill Changes for 2021/22

1.40 Each year, PTE infills are prepared by Steer (West Midlands) and Mott MacDonald (Greater Manchester, Merseyside, South Yorkshire, Tyne and Wear, West Yorkshire, Strathclyde).

1.41 These infills are subject to annual improvements, which normally represent a simple update, but some years contain a step change in the methodology.

Tyne & Wear – inclusion of Network One and concessionary demand

1.42 In 2021/22, infill demand from the Network One and concessionary tickets in Tyne & Wear has been included for the first time. The infill demand is based on heavy rail patronage data provided by Nexus which is derived from their Continuous Monitoring Surveys. This data contains full annual patronage figures for rail journeys, split by ticket type and for origin-destination flows. This enables the infill totals and distributions to be derived directly from the data.

1.43 The ticket types included are Network One Anytime, Network One DayRovers, Transfare tickets and Concession ENCTs passes. This methodology change accounts for an increase of 49.9k journeys (99.8k entries & exits) in the Tyne & Wear PTE area in 2021/22, which equates to a 1.3% increase in entries and exits across the T&W PTE area.

West Yorkshire PTE – updated distribution

1.44 In 2020/21, a new distribution was used for allocating the journeys on West Yorkshire PTE products to specific flows. 2019/20 MCard smartcard data was used, replacing the out-of-date 2013/14 WYCA fares survey data. The MCard data covers 80% of passengers travelling to 80% of stations and is more suited to demand modelling. It consists of raw tap-in/tap-out data covering all time periods and contains 15,000 smartcards, specified by PTE ticket type, which are assigned to an origin station based on postcode.

1.45 In 2021/22 this MCard distribution was updated by using 2021/22 data (replacing the pre-pandemic 2019/20 data), better reflecting post-pandemic travel patterns. The sample size is also greater than the 2019/20 data, covering a full year rather than one week.

1.46 As per the previous year, the new distribution was evaluated for each station, with a threshold set to adjust a small number of anomalous results using ratios based on the distribution used in previous years and RSP (LENNON) data.

1.47 This methodology change does not affect the total number of journeys included in the infill, but it does impact their distribution across the network. The main conclusions are that stations in outer zones are taking longer to recover their pre-Covid demand levels than

stations in inner zones (likely due to longer commute times into Leeds indicating more reluctance to return to pre-pandemic levels of commuting).

Season ticket journey adjustments

London

1.48 In the production of previous years' statistics, adjustments were made to account for situations where passengers buy season tickets for travel to/from a station other than the one they generally travel from, providing additional travel flexibility. This issue, and the previous adjustments, are described in detail later in this report.

1.49 In some areas, multiple stations have identically priced season tickets to London. As a result, London season tickets are generally sold as being from the furthest station, regardless of the actual origin of travel, giving the passenger additional flexibility for no increase in fare. This means that the ticket sales data shows that there are more people travelling to/from this station than is the case.

1.50 LENNON sales data was used to estimate the number of tickets where the issuing office (the location at which the season ticket is obtained by the customer) was at a branch line station, but the ticket origin showed a station further along the line. For the ten flows with the highest absolute number of ticket journeys being issued from stations different to the ticket origin, it was assumed that the true origin of the journeys was the issuing location, and not the recorded origin.

1.51 For the production of the 2021/22 statistics, the analysis underpinning this reallocation was updated with 2021/22 LENNON data. Table 1.6 shows the scale of the adjustments.

Table 1.6: Summary of London season ticket adjustments in 2021/22

Station TLC	Station Name	Station Group	Adjusted Entries & Exits	Total Entries & Exits
SOV	Southend Victoria	Southend Victoria Branch	-140,773	1,101,256
HOC	Hockley	Southend Victoria Branch	44,521	630,040
RLG	Rayleigh	Southend Victoria Branch	70,590	1,027,610
RFD	Rochford	Southend Victoria Branch	25,662	458,118
OXF	Oxford	Oxford/Didcot Parkway	-47,051	5,013,078
DID	Didcot Parkway	Oxford/Didcot Parkway	47,051	2,023,958
GLM	Gillingham (Kent)	Medway	-32,621	1,860,628
CTM	Chatham	Medway	12,004	1,729,376
RTR	Rochester	Medway	10,170	1,458,322
SOO	Strood (Kent)	Medway	10,447	871,946
GTW	Gatwick Airport	Gatwick Airport/Horley	-27,809	5,919,044
HOR	Horley	Gatwick Airport/Horley	27,809	799,638
REI	Reigate	Reigate/Redhill	-17,763	892,884
RDH	Redhill	Reigate/Redhill	17,763	2,052,974
EGR	East Grinstead	East Grinstead/Lingfield	-17,286	711,122
LFD	Lingfield	East Grinstead/Lingfield	17,286	318,182
UCK	Uckfield	Uckfield	-16,055	158,916
COH	Crowborough	Uckfield	16,055	165,884
CTM	Chatham	Chatham/Rochester	-9,617	1,729,376
RTR	Rochester	Chatham/Rochester	9,671	1,458,322
SOU	Southampton Central	Southampton Airport Parkway	-8,904	4,294,330
SOA	Southampton Airport Parkway	Southampton Airport Parkway	8,904	780,160
RTR	Rochester	Rochester/Strood	-7,358	1,458,322
SOO	Strood (Kent)	Rochester/Strood	7,358	871,946

Cardiff

1.52 In the stakeholder feedback and consultation as part of the production of the 2019/20 estimates of station usage, TfW highlighted that there were several end-of-line or end-of-fare-zone stations that potentially have over-estimates of season ticket usage and corresponding under-estimates at preceding stations.

1.53 This is the same issue that the adjustment described above attempts to address for season ticket flows to/from London, so an equivalent methodology was developed for season ticket flows to/from Cardiff during the production of the 2020/21 estimates of station usage, with LENNON sales data being used to estimate the number of tickets where the issuing office is different to the origin station on the season ticket.

1.54 For the production of the 2021/22 statistics, the analysis underpinning this reallocation was updated with 2021/22 LENNON data. Table 1.7 shows the scale of the adjustments.

Table 1.7: Summary of Cardiff season ticket adjustments in 2021/22

Station TLC	Station Name	Station Group	Adjusted Entries & Exits	Total Entries & Exits
PPD	Pontypridd	Pontypridd/Trefforest	-9,847	408,742
TRF	Trefforest	Pontypridd/Trefforest	9,847	397,730
BYI	Barry Island	Barry	-21,564	303,684
BRY	Barry	Barry	9,132	349,146
BYD	Barry Docks	Barry	1,439	169,502
CAD	Cadoxton	Barry	10,994	204,930
ABE	Aber	Aber/Caerphilly	-1,870	73,642
CPH	Caerphilly	Aber/Caerphilly	1,870	372,912
SRR	Sarn	Sarn/Bridgend	-964	33,834
BGN	Bridgend	Sarn/Bridgend	964	937,180
RDR	Radyr	Radyr/Llandaf	-752	244,646
LLN	LLandaf	Radyr/Llandaf	752	262,432
POR	Porth	Porth/Dinas	-1,207	122,578
DMG	Dinas (Rhondda)	Porth/Dinas	511	25,050
PPD	Pontypridd	Porth/Dinas	696	408,742
HNG	Hengoed	Hengoed/Ystrad Mynach	-1,048	73,330
YSM	Ystrad Mynach	Hengoed/Ystrad Mynach	1,048	136,086
ECP	Energlyn & Churchill Park	Energlyn/Caerphilly	-593	44,102
CPH	Caerphilly	Energlyn/Caerphilly	593	372,912
TRB	Treherbert	Treherbert/Pontypridd	-389	95,984
PPD	Pontypridd	Treherbert/Pontypridd	389	408,742
PGM	Pengam	Pengam/Caerphilly	-723	125,188
CPH	Caerphilly	Pengam/Caerphilly	723	372,912

1.55 This adjustment leads to a significant impact (>2%) at 8 of these stations.

Inclusion of Caledonian Sleeper tickets

1.56 MOIRA2.2 does not model overnight (sleeper) services, and therefore dedicated sleeper products are not included in the MOIRA2.2 base matrix used as the starting point for the estimates of station usage. The volume of tickets excluded from the MOIRA2.2 base matrix has increased in recent years, as the Caledonian Sleeper TOC has moved towards more 'all inclusive' tickets which include travel and accommodation (and can therefore be identified as sleeper tickets and removed from the matrix) rather than 'sleeper supplements' (which have no journeys assigned to them in LENNON) used in conjunction with tickets valid on daytime trains (which have no way of being identified as being used on sleeper services).

1.57 Therefore, in the processing of the 2020/21 statistics, an extra LENNON query was used to extract such Caledonian Sleeper tickets and these were incorporated into the statistics. For the production of the 2021/22 statistics, this analysis was updated with 2021/22 LENNON data. This resulted in the addition of c. 153k journeys (306k entries and exits), with the vast majority at London Euston and stations in Scotland, as show in Table 1.8 below.

Table 1.8: Summary of additional Caledonian Sleeper entries and exits in 2021/22

Station TLC	Station Name	Entries & Exits Added	Total Entries & Exits	% Impact
EUS	London Euston	147,974	23,097,606	0.6%
EDB	Edinburgh	37,234	13,617,536	0.3%
INV	Inverness	37,190	753,228	4.9%
GLC	Glasgow Central	27,261	15,322,350	0.2%
FTW	Fort William	22,291	114,230	19.5%
ABD	Aberdeen	9,958	1,536,720	0.6%
AVM	Aviemore	3,996	92,240	4.3%
CRE	Crewe	2,917	2,717,032	0.1%
DEE	Dundee	1,936	1,167,730	0.2%
LEU	Leuchars (For St. Andrews)	1,186	369,542	0.3%
PTH	Perth	1,186	614,804	0.2%
WFJ	Watford Junction	1,178	4,127,024	0.0%
PIT	Pitlochry	923	84,374	1.1%
CNR	Crianlarich	751	11,030	6.8%
GLE	Gleneagles	709	65,680	1.1%
PRE	Preston (Lancs)	682	4,165,132	0.0%
STG	Stirling	594	1,435,624	0.0%
STN	Stonehaven	594	286,176	0.2%
CRR	Corrour	573	11,518	5.0%
RAN	Rannoch	526	6,246	8.4%
Other stations (<500 E&Es added each)		6,861	n/a	n/a

Demand allocation at Group Stations

1.58 To validate and improve the allocation of journeys to/from stations within groups (e.g. Dorking BR), passenger counts are routinely carried out at selected group stations on the network. The most recent counts were carried out at a number of stations during Spring 2020. Due to the COVID-19 pandemic, no new counts were carried out in time for inclusion in the 2021/22 estimates of station usage but the following splits derived from historic counts were applied during their production.

1.59 The proportion of journeys split between stations based on historic counts are shown in Table 1.9 below, which were implemented in the production of the 2021/22 estimates of station usage.

Table 1.9: Count-based adjustments to 2021/22 statistics

Station Name	Station Group	Proportions	Year Undertaken
Colchester	COLCHESTER BR	85%	2013/14
Colchester Town	COLCHESTER BR	15%	2013/14
Bedford	BEDFORD BR	96%	2014/15
Bedford St Johns	BEDFORD BR	4%	2014/15
Dorking (Deepdene)	DORKING BR	25%	2014/15
Dorking (Main)	DORKING BR	72%	2014/15
Dorking West	DORKING BR	3%	2014/15
Farnborough (Main)	FARNBOROUGH BR	82%	2013/14
Farnborough North	FARNBOROUGH BR	18%	2013/14

Station Name	Station Group	Proportions	Year Undertaken
Maidstone Barracks	MAIDSTONE BR	11%	2013/14
Maidstone East	MAIDSTONE BR	55%	2013/14
Maidstone West	MAIDSTONE BR	34%	2013/14
Newark Castle	NEWARK BR	46%	2015/16
Newark North Gate	NEWARK BR	54%	2015/16
Portsmouth & Southsea	PORTSMOUTH BR	49%	2014/15
Portsmouth Harbour	PORTSMOUTH BR	51%	2014/15
Wakefield Westgate	WAKEFIELD BR	82%	2014/15
Wakefield Kirkgate	WAKEFIELD BR	18%	2014/15
Canterbury East	CANTERBURY BR	30%	2014/15
Canterbury West	CANTERBURY BR	70%	2014/15
Falkirk Grahamston	FALKIRK BR	44%	2014/15
Falkirk High	FALKIRK BR	56%	2014/15
Helensburgh Central	HELENSBURGH BR	98%	2014/15
Helensburgh Upper	HELENSBURGH BR	2%	2014/15
Southend Central	SOUTHEND BR	46%	2015/16
Southend Victoria	SOUTHEND BR	28%	2015/16
Southend East	SOUTHEND BR	26%	2015/16
Wigan North Western	WIGAN BR	52%	2015/16
Wigan Wallgate	WIGAN BR	48%	2015/16
Folkestone Central	FOLKESTONE BR	57%	2018/19
Folkestone West	FOLKESTONE BR	43%	2018/19
Hertford East	HERTFORD BR	51%	2018/19
Hertford North	HERTFORD BR	49%	2018/19
Guildford	GUILDFORD BR	88%	2018/19
London Road (Guildford)	GUILDFORD BR	12%	2018/19
Worcester Foregate Street	WORCESTER BR	77%	2019/20
Worcester Shrub Hill	WORCESTER BR	23%	2019/20
Dorchester South	DORCHESTER BR	83%	2019/20
Dorchester West	DORCHESTER BR	17%	2019/20
Warrington Bank Quay	WARRINGTON BR	51%	2019/20
Warrington Central	WARRINGTON BR	49%	2019/20
Edenbridge (Kent)	EDENBRIDGE BR	35%	2019/20
Edenbridge Town	EDENBRIDGE BR	65%	2019/20

Station Name	Station Group	Proportions	Year Undertaken
Deansgate	MANCHESTER BR	3%	2019/20
Manchester Oxford Road	MANCHESTER BR	13%	2019/20
Manchester Piccadilly	MANCHESTER BR	65%	2019/20
Manchester Victoria	MANCHESTER BR	19%	2019/20

Updated Heathrow Station splits

1.60 To improve the allocation of demand between the 3 rail stations within Heathrow Airport (Terminals 2&3, Terminal 4 and Terminal 5) data was supplied by Heathrow. This data replaces the derived splits from LENNON data (see Appendix A, category 2) and is based on gateline data collected by Heathrow. This is a more accurate representation of the split of passenger usage at the 3 Heathrow rail stations, as it is derived from actual passenger movements rather than sales data. These updated splits were included in the 2021/22 estimates of station usage.

Other Infill Review

1.61 During the 2020/21 stakeholder feedback, it was noted that there is a Derbyshire Rover ticket (Derbyshire Wayfarer) which was not previously included in the estimates of station usage as it is neither a PTE product nor currently covered in the 'Other' infill which included other ranger/rover tickets.

1.62 This helpful feedback prompted a review of the products included in this 'Other' infill, to ensure all relevant products with material usage are included in the estimates where feasible. Alongside the tickets already included in the infill, a few other tickets were identified for inclusion. This included the Derbyshire Wayfarer, Brighton and Worthing Unizone cards and some more variations of the Bristol Freedom Pass product.

1.63 These products were incorporated into the 'Other' infill using the same methodology that is applied for the existing products in the infill (where total annual demand from LENNON is allocated using distributions derived from the MOIRA2.2 base matrix). In 2021/22 this led to c. 308k journeys (c. 616k entries and exits) being added to the estimates of station usage.

Methodological Changes in 2020/21

PTE Infill Changes for 2020/21

1.64 Each year, PTE infills are prepared by Steer (West Midlands) and Mott MacDonald (Greater Manchester, Merseyside, South Yorkshire, Tyne and Wear, West Yorkshire, Strathclyde).

1.65 These infills are subject to annual improvements, which normally represent a simple update, but some years contain a step change in the methodology.

West Yorkshire PTE – updated distribution

1.66 In 2020/21, a new distribution was used for allocating the journeys on West Yorkshire PTE products to specific flows. 2019/20 MCard smartcard data was used, replacing the out-of-date 2013/14 WYCA fares survey data.

1.67 The MCard data is more recent than the fares survey data and has a better sample size (it covers 80% of passengers travelling to 80% of stations) and is more suited to demand modelling. It consists of raw tap-in/tap-out data covering all time periods, all days for one

week of February (and hence is seasonally adjusted). The data contains 15,000 smartcards, specified by PTE ticket type, 80% of which are assigned an origin station based on postcode.

1.68 In consultation with WYCA, the new distribution was evaluated for each station, with a threshold set to adjust any anomalous results using ratios based on the distribution used in previous years and RSP (LENNON) data.

1.69 This methodology change does not affect the total number of journeys included in the infill but it does impact their distribution across the network. The main conclusions are that stations in key centres (such as city centres) remained mainly unchanged by the new methodology, although there was a general redistribution of demand within the infill with some focus on small to moderate sized stations increasing their share demand from nearby moderate to large stations. Most of the stations that had figures above the threshold described in the previous paragraph were adjusted accordingly.

West Yorkshire PTE – zero-fare concessions

1.70 The objective of this methodological update was to add zero-fare concessionary journeys into the 2020/21 PTE infill for West Yorkshire. Only paid concessions are covered in MCard data (e.g. ENCTS passes) but free concessions are also thought to offer a significant portion of PTE demand in the region.

1.71 The 2013/14 WY fares survey contained a 'zero-fare concessions' ticket type which was used to identify the proportion of journeys made on such tickets in comparison to the other PTE tickets.

1.72 Paid concessions are already included in the infill (and/or base matrix), whereas zero-fare concessions for blind passes, staff passes and school cards were estimated and included for the first time this year. It was decided that child travel for under-5s should not be included as this would be inconsistent with the rest of the rail network (where U5s can travel for free without a ticket and therefore would not be present in the MOIRA2.2 base matrix).

1.73 This methodology change accounts for an increase of **160k** journeys (320k entries and exits) across the West Yorkshire PTE area in 2020/21. Of these journeys, 78% are attributed to staff passes, 15% to school cards and 8% to blind passes. The addition of these journeys equates to a 1.9% increase in entries and exits across the West Yorkshire PTE area.

South Yorkshire PTE

1.74 Up to 2018/19 the Rail Master ticket (owned and operated by Northern Rail and Supertram) was estimated using the South Yorkshire scaled passenger surveys. These surveys were discontinued in 2019/20 so an alternative data source was required – in that year Rail Master journeys were estimated by using proportionality based on LENNON vs non-LENNON Travel Master tickets (a SYPTE ticket) and applied to Rail Master LENNON data.

1.75 For 2020/21, Rail Master journey data was unavailable from stakeholders, so further investigation into the historic data was conducted, revealing that the LENNON estimate of Rail Master journeys has actually been higher over time than the historic passenger survey data. Therefore, the historic method may have been underestimating Rail Master journeys.

1.76 Therefore, in 2020/21, the LENNON figure of **29k** journeys has been used (distributed by pivoting off the origin totals and applying to destinations based on a Full ticket distribution from LENNON).

1.77 This methodological update generates an increase of approximately 21k entries and exits across the South Yorkshire PTE area in 2020/21, which represents an increase of 0.5% in entries and exits across the region.

West Midlands PTE

1.78 In the West Midlands PTE infill processing, the 'base' LENNON data used for distributing demand between origin and destinations at a ticket-type level has been fixed since the infill's original development (in 2010/11). The LENNON data also has a small impact on the total level of demand estimated in the infill because the concessionary factors (which are used to uplift demand to estimate concessionary travel) are applied based on the total demand which consists of the estimated infill journeys plus demand from the base LENNON data.

1.79 For 2020/21, the base LENNON data has been updated for this year's figures, which should better reflect recent travel patterns, whilst also provide a better estimate of concessionary journeys.

1.80 This methodology change accounts for a c.2% increase in journeys in the infill and has a small impact on the amount of demand allocated to each station in the infill. The methodology change leads to an increase of approximately 177k additional entries and exits across the West Midlands PTE area in 2020/21, which represents an increase of 0.6% in entries and exits across the region.

Season ticket journey adjustments

London

1.81 In the production of previous years' statistics, adjustments were made to account for situations where passengers buy season tickets for travel to/from a station other than the one they generally travel from, in order to allow additional flexibility. This issue, and the previous adjustments, are described in detail later in this report.

1.82 In some areas, multiple stations have identically priced season tickets to London. As a result, London season tickets are generally sold as being from the furthest station, regardless of the actual origin of travel, giving the passenger additional flexibility for no increase in fare. This means that the ticket sales data shows that there are more people travelling to/from this station than is the case.

1.83 LENNON sales data was used to estimate the number of tickets where the issuing office (the location at which the season ticket is obtained by the customer) was at a branch line station, but the ticket origin showed a station further along the line. For the ten flows with the highest absolute number of ticket journeys being issued from stations different to the ticket origin, it was assumed that the true origin of the journeys was the issuing location, and not the recorded origin.

1.84 For the production of the 2020/21 statistics, the analysis underpinning this reallocation was updated with 2020/21 LENNON data. Table 1.10 shows the scale of the adjustments.

Table 1.10: Summary of London season ticket adjustments in 2020/21

Station TLC	Station Name	Station Group	Adjusted Entries & Exits	Total Entries & Exits
SOV	Southend Victoria	Southend Victoria Branch	-67,475	559,604
HOC	Hockley	Southend Victoria Branch	18,995	247,272
RLG	Rayleigh	Southend Victoria Branch	33,551	352,356
RFD	Rochford	Southend Victoria Branch	12,771	189,916
PRL	Prittlewell	Southend Victoria Branch	2,158	97,456
REI	Reigate	Reigate/Redhill	-6,562	368,840
RDH	Redhill	Reigate/Redhill	6,562	750,734
SOU	Southampton Central	Southampton Airport Parkway	-7,018	1,448,076
SOA	Southampton Airport Parkway	Southampton Airport Parkway	6,207	233,020
WIN	Winchester	Southampton Airport Parkway	811	1,110,632
EGR	East Grinstead	East Grinstead/Lingfield	-8,539	257,052
DMS	Dormans	East Grinstead/Lingfield	1,382	43,080
LFD	Lingfield	East Grinstead/Lingfield	7,157	127,616
CTM	Chatham	Chatham/Rochester	-8,978	825,756
RTR	Rochester	Chatham/Rochester	8,978	585,242
UCK	Uckfield	Uckfield	-9,401	48,824
COH	Crowborough	Uckfield	7,666	56,362
ERI	Eridge	Uckfield	903	15,882
HHE	Haywards Heath	Uckfield	832	954,854
GLM	Gillingham (Kent)	Medway	-35,246	939,810
CTM	Chatham	Medway	8,895	825,756
RTR	Rochester	Medway	8,637	585,242
SOO	Strood (Kent)	Medway	17,714	454,344
OXF	Oxford	Oxford/Didcot Parkway	-16,254	1,574,610
DID	Didcot Parkway	Oxford/Didcot Parkway	16,254	583,570
GRV	Gravesend	Kent High Speed	-9,520	882,102
EBD	Ebbsfleet International	Kent High Speed	8,751	416,768
SFA	Stratford International	Kent High Speed	769	741,444
HIB	High Brooms	Tonbridge	-5,342	292,158
TON	Tonbridge	Tonbridge	1,234	1,210,442
TBW	Tunbridge Wells	Tonbridge	4,108	735,876

Cardiff

1.85 In the stakeholder feedback and consultation as part of the production of the 2019/20 estimates of station usage, TfW highlighted that there were several end-of-line or end-of-fare-zone stations that potentially have over-estimates of season ticket usage and corresponding under-estimates at preceding stations.

1.86 This is the same issue as the adjustment described above attempts to address for season ticket flows to/from London, so an equivalent methodology was developed for season ticket flows to/from Cardiff, with LENNON sales data being used to estimate the number of tickets where the issuing office is different to the origin station on the season ticket.

1.87 For the production of the 2020/21 statistics, the following adjustments in Table 1.11 were generated based on that methodology.

Table 1.11: Summary of Cardiff season ticket adjustments in 2020/21

Station TLC	Station Name	Station Group	Adjusted Entries & Exits	Total Entries & Exits
PPD	Pontypridd	Pontypridd/Trefforest	-3,030	153,272
TRF	Trefforest	Pontypridd/Trefforest	3,030	79,490
BYI	Barry Island	Barry	-17,401	110,356
BRY	Barry	Barry	7,430	109,594
CAD	Cadoxton	Barry	9,971	75,100
TRB	Treherbert	Treherbert/Pontypridd	-821	27,518
PPD	Pontypridd	Treherbert/Pontypridd	821	153,272
HNG	Hengoed	Hengoed/Ystrad Mynach	-517	23,108
YSM	Ystrad Mynach	Hengoed/Ystrad Mynach	517	35,256

1.88 This adjustment leads to a significant impact (>2%) at 7 of the 8 stations, most of which correspond to stations highlighted in the original TfW feedback. Whilst the adjustment is reasonably modest this year, it is expected to have a more substantial impact in future years when season-ticket usage (driven by a return to commuting) has recovered more significantly than it did during 2020/21.

Inclusion of Caledonian Sleeper tickets

1.89 MOIRA2.2 does not model overnight (sleeper) services, and therefore dedicated sleeper products are not included in the MOIRA2.2 base matrix used as the starting point for the estimates of station usage. The volume of tickets excluded from the MOIRA2.2 base matrix has increased in recent years, as the Caledonian Sleeper TOC has moved towards more 'all inclusive' tickets which include travel and accommodation (and can therefore be identified as sleeper tickets and removed from the matrix) rather than 'sleeper supplements' (which have no journeys assigned to them in LENNON) used in conjunction with tickets valid on daytime trains (which have no way of being identified as being used on sleeper services).

1.90 Therefore, in the processing of the 2020/21 statistics, an extra LENNON query was used to extract such Caledonian Sleeper tickets and these were incorporated into this year's statistics. This resulted in the addition of c. 62k journeys (124k entries and exits), with the vast majority at London Euston and stations in Scotland, as show in Table 1.12 below.

Table 1.12: Summary of additional Caledonian Sleeper entries and exits in 2020/21

Station TLC	Station Name	Entries & Exits Added	Total Entries & Exits	% Impact
EUS	London Euston	59,569	6,606,698	0.9%
INV	Inverness	22,907	231,894	9.9%
EDB	Edinburgh	12,371	2,957,732	0.4%
FTW	Fort William	11,969	22,316	53.6%
GLC	Glasgow Central	4,749	5,325,090	0.1%
AVM	Aviemore	2,108	25,492	8.3%
ABD	Aberdeen	1,424	393,982	0.4%
CRE	Crewe	1,394	746,474	0.2%
GLQ	Glasgow Queen Street	728	2,299,020	0.0%
PTH	Perth	701	181,454	0.4%
PIT	Pitlochry	500	22,450	2.2%
Other stations (<500 E&Es added each)		5,514	n/a	n/a

Refunds Adjustments

1.91 There were no refunds adjustments made during the production of the 2020/21 statistics, other than those which were made directly in the MOIRA2.2 base matrix. In the production of the base matrix, refunds for annual and monthly season tickets were excluded this year. The rationale behind this exclusion was to account for the large numbers of season ticket refunds that were backdated to the start of the first lockdown in mid-March 2020 but not processed (and thus did not appear in LENNON) until the 2020/21 financial year.

1.92 When aggregated across the financial year, if refunds were not excluded from the base matrix, on many flows seasons refunds exceeded sales leading to negative revenues and journeys. This is not reflective of the passenger usage during 2020/21 as the refunds related to sales in the previous financial year. Therefore, all seasons refunds with validity longer than one week were excluded from the MOIRA2.2 base matrix.

Demand allocation at Group Stations

1.93 To validate and improve the allocation of journeys to/from stations within groups (e.g. Dorking BR), passenger counts are routinely carried out at selected group stations on the network. The most recent counts were carried out at a number of stations during Spring 2020. Due to the COVID-19 pandemic, no new counts were carried out during 2020/21 but the following splits derived from historic counts were applied during the production of the 2020/21 estimates of station usage.

1.94 The proportion of journeys split between stations based on historic counts are shown in Table 1.13 below, which were implemented in the production of the 2020/21 estimates of station usage.

Table 1.13: Count-based adjustments to 2020/21 statistics

Station Name	Station Group	Proportions	Year Undertaken
Colchester	COLCHESTER BR	85%	2013/14
Colchester Town	COLCHESTER BR	15%	2013/14
Bedford	BEDFORD BR	96%	2014/15
Bedford St Johns	BEDFORD BR	4%	2014/15
Dorking (Deepdene)	DORKING BR	25%	2014/15

Station Name	Station Group	Proportions	Year Undertaken
Dorking (Main)	DORKING BR	72%	2014/15
Dorking West	DORKING BR	3%	2014/15
Farnborough (Main)	FARNBOROUGH BR	82%	2013/14
Farnborough North	FARNBOROUGH BR	18%	2013/14
Maidstone Barracks	MAIDSTONE BR	11%	2013/14
Maidstone East	MAIDSTONE BR	55%	2013/14
Maidstone West	MAIDSTONE BR	34%	2013/14
Newark Castle	NEWARK BR	46%	2015/16
Newark North Gate	NEWARK BR	54%	2015/16
Portsmouth & Southsea	PORTSMOUTH BR	49%	2014/15
Portsmouth Harbour	PORTSMOUTH BR	51%	2014/15
Wakefield Westgate	WAKEFIELD BR	82%	2014/15
Wakefield Kirkgate	WAKEFIELD BR	18%	2014/15
Canterbury East	CANTERBURY BR	30%	2014/15
Canterbury West	CANTERBURY BR	70%	2014/15
Falkirk Grahamston	FALKIRK BR	44%	2014/15
Falkirk High	FALKIRK BR	56%	2014/15
Helensburgh Central	HELENSBURGH BR	98%	2014/15
Helensburgh Upper	HELENSBURGH BR	2%	2014/15
Southend Central	SOUTHEND BR	46%	2015/16
Southend Victoria	SOUTHEND BR	28%	2015/16
Southend East	SOUTHEND BR	26%	2015/16
Wigan North Western	WIGAN BR	52%	2015/16
Wigan Wallgate	WIGAN BR	48%	2015/16
Folkestone Central	FOLKESTONE BR	57%	2018/19
Folkestone West	FOLKESTONE BR	43%	2018/19
Hertford East	HERTFORD BR	51%	2018/19
Hertford North	HERTFORD BR	49%	2018/19
Guildford	GUILDFORD BR	88%	2018/19
London Road (Guildford)	GUILDFORD BR	12%	2018/19
Worcester Foregate Street	WORCESTER BR	77%	2019/20
Worcester Shrub Hill	WORCESTER BR	23%	2019/20
Dorchester South	DORCHESTER BR	83%	2019/20
Dorchester West	DORCHESTER BR	17%	2019/20

Station Name	Station Group	Proportions	Year Undertaken
Warrington Bank Quay	WARRINGTON BR	51%	2019/20
Warrington Central	WARRINGTON BR	49%	2019/20
Edenbridge (Kent)	EDENBRIDGE BR	35%	2019/20
Edenbridge Town	EDENBRIDGE BR	65%	2019/20
Deansgate	MANCHESTER BR	3%	2019/20
Manchester Oxford Road	MANCHESTER BR	13%	2019/20
Manchester Piccadilly	MANCHESTER BR	65%	2019/20
Manchester Victoria	MANCHESTER BR	19%	2019/20

Methodological Changes in 2019/20

PTE Infill Changes for 2019/20

1.95 Each year, PTE infills are prepared by Steer (West Midlands) and Mott MacDonald (Greater Manchester, Merseyside, South Yorkshire, Tyne and Wear, West Yorkshire, Strathclyde).

1.96 These infills are subject to annual improvements, which normally represent a simple update, but some years contain a step change in the methodology.

Merseyside PTE

1.97 For 2019/20, Saveaway and Trio ticket sales were included for Merseyrail PTE for both off-network sales (commercial retailers, non-commercial retailers and Merseytravel centres) and sales at stations and on trains. In 2018/19 (and in previous years) off-network sales were not included.

1.98 Concession tickets are calculated relative to the non-concession tickets (using historical relativities); therefore, they also increase as a result of the inclusion of the off-network Trio & Saveaway tickets. The table below shows the split of sales by PTE product for Merseyside.

Table 1.14: Summary of Merseyside PTE Infill change in 2019/20

Ticket Type	2018/19 Journeys	2019/20 Journeys	Abs Change 2018/19-2019/20	% change 2018/19-2019/2020
Saveaway – Adult	1,038,639	1,930,784	892,145	85.90%
Saveaway – Child	215,015	392,483	177,468	82.54%
Trio – Adult	2,349,938	3,037,230	687,292	29.25%
Trio – Child & Scholar	660,500	1,132,644	472,144	71.48%
Concessions – Pensioners	5,956,894	6,875,788	918,894	15.43%
Concessions – Disabled	810,965	936,062	125,097	15.43%
Railpass (LENNON)	5,847,740	5,871,790	24,050	0.41%
Daysaver	2,112,951	2,148,599	35,648	1.69%

Ticket Type	2018/19 Journeys	2019/20 Journeys	Abs Change 2018/19-2019/20	% change 2018/19-2019/2020
Northern / Wirral Lines	2,677,634	2,687,693	10,059	0.38%
Total	**21,670,276**	**25,013,073**	**3,342,797**	**15.43%**

1.99 This methodology change accounts for an increase of 3.6m journeys (7.2m entries and exits) across the Merseyside PTE area in 2019/20. Without the methodology change, the change from 2018/19 to 2019/20 would have been -0.3m journeys (-0.6m entries and exits, a -1.3% year-on-year change).

South Yorkshire PTE

1.100 For 2019/20, concession tickets (senior and disabled) have been included for the first time. The table below shows the split of sales by PTE product for South Yorkshire.

Table 1.15: Summary of South Yorkshire PTE Infill change in 2019/20

Ticket Type	2018/19 Journeys	2019/20 Journeys	Abs Change 2018/19-2019/20	% change 2018/19-2019/2020
Rail Master	224,653	168,801	-55,852	-24.86%
Travel Master	558,527	478,423	-80,104	-14.34%
Concessions	0	223,308	223,308	n/a
Total	783,180	870,532	87,352	11.15%

1.101 The uplift generated by including the concession tickets offsets the decline that would have been seen across the other ticket types. The net effect is an increase of 87,352 journeys (174,704 entries and exits) across the South Yorkshire PTE area in 2019/20.

Season ticket journey adjustments

1.102 In the production of previous years' statistics, adjustments were made to account for situations where passengers buy season tickets for travel to/from a station other than the one they generally travel from, in order to allow additional flexibility. This issue, and the previous adjustments, are described in detail in later in this report.

1.103 In some areas, multiple stations have identically priced season tickets to London. As a result, London season tickets are generally sold as being from the furthest station, regardless of the actual origin of travel, giving the passenger additional flexibility for no increase in fare. This means that the ticket sales data shows that there are more people travelling to/from this station than is the case.

1.104 LENNON sales data was used to estimate the number of tickets where the issuing office (the location at which the season ticket is obtained by the customer) was at a branch line station, but the ticket origin showed a station further along the line. For the ten stations with the highest absolute number of ticket journeys being issued from a station different to the ticket origin, it was assumed that the true origin of the journeys was the issuing location, and not the recorded origin.

1.105 For the production of the 2019/20 statistics, the analysis underpinning this reallocation was updated with 2019/20 LENNON data. Table 1.16 shows the scale of the adjustments.

Table 1.16: Summary of season ticket adjustment in 2019/20

Station TLC	Station Name	Station Group	Adjusted Entries & Exits	Total Entries & Exits
SOV	Southend Victoria	Southend Victoria Branch	-828,124	1,719,086
HOC	Hockley	Southend Victoria Branch	255,876	978,212
RLG	Rayleigh	Southend Victoria Branch	428,527	1,660,412
RFD	Rochford	Southend Victoria Branch	120,687	597,582
PRL	Prittlewell	Southend Victoria Branch	23,035	227,204
REI	Reigate	Reigate/Redhill	-123,490	1,464,894
MHM	Merstham	Reigate/Redhill	2,213	820,316
RDH	Redhill	Reigate/Redhill	121,277	3,661,686
CHW	Chalkwell	Southend Central Branch	-96,317	1,832,344
BEF	Benfleet	Southend Central Branch	63,092	3,354,214
LES	Leigh-On-Sea	Southend Central Branch	33,225	2,315,160
SOU	Southampton Central	Southampton Airport Parkway	-58,980	6,351,828
SOA	Southampton Airport Parkway	Southampton Airport Parkway	58,980	1,592,654
EGR	East Grinstead	East Grinstead/Lingfield	-63,839	1,469,838
DMS	Dormans	East Grinstead/Lingfield	4,179	112,312
LFD	Lingfield	East Grinstead/Lingfield	55,219	507,852
TBD	Three Bridges	East Grinstead/Lingfield	4,442	3,190,348
ELD	Earlswood (Surrey)	Earlswood/Redhill	-62,466	434,830
RDH	Redhill	Earlswood/Redhill	62,466	3,661,686
CTM	Chatham	Chatham/Rochester	-56,215	2,619,120
RTR	Rochester	Chatham/Rochester	56,215	2,121,874
CBG	Cambridge	Cambridge	-73,157	11,599,814
AUD	Audley End	Cambridge	55,680	1,006,730
NWE	Newport (Essex)	Cambridge	2,802	195,984
WLF	Whittlesford Parkway	Cambridge	14,675	552,024
UCK	Uckfield	Uckfield	-80,138	387,252
BXD	Buxted	Uckfield	24,161	158,546
COH	Crowborough	Uckfield	49,899	376,424
ERI	Eridge	Uckfield	6,077	129,726
GLM	Gillingham (Kent)	Medway	-171,564	2,515,400
CTM	Chatham	Medway	45,700	2,619,120
RTR	Rochester	Medway	56,681	2,121,874
SOO	Strood (Kent)	Medway	69,183	1,158,876

Demand allocation at Group Stations

1.106 To validate and improve the allocation of journeys to/from stations within groups (e.g. Dorking BR), passenger counts are routinely carried out at selected group stations on the network. The most recent counts were carried out at a number of stations during Spring 2020, with the following groups having their splits updated:

- Dorchester BR
- Edenbridge BR
- Warrington BR

- Worcester BR

1.107 These Spring 2020 counts were used both to validate existing data, and to create or update station group counts splits, with four sets of station counts splits updated. The proportion of journeys split between stations based on routine counts are shown in Table 1.17 below. In addition to the four updated sets of station counts splits, updated splits for the Manchester BR group stations were provided by Transport for Greater Manchester, which were implemented for the 2019/20 statistics.

Table 1.17: Count-based adjustments to 2019/20 statistics

Station Name	Station Group	Proportions	Year Undertaken
Colchester	COLCHESTER BR	85%	2013/14
Colchester Town	COLCHESTER BR	15%	2013/14
Bedford	BEDFORD BR	96%	2014/15
Bedford St Johns	BEDFORD BR	4%	2014/15
Dorking (Deepdene)	DORKING BR	25%	2014/15
Dorking (Main)	DORKING BR	72%	2014/15
Dorking West	DORKING BR	3%	2014/15
Farnborough (Main)	FARNBOROUGH BR	82%	2013/14
Farnborough North	FARNBOROUGH BR	18%	2013/14
Maidstone Barracks	MAIDSTONE BR	11%	2013/14
Maidstone East	MAIDSTONE BR	55%	2013/14
Maidstone West	MAIDSTONE BR	34%	2013/14
Newark Castle	NEWARK BR	46%	2015/16
Newark North Gate	NEWARK BR	54%	2015/16
Portsmouth & Southsea	PORTSMOUTH BR	49%	2014/15
Portsmouth Harbour	PORTSMOUTH BR	51%	2014/15
Wakefield Westgate	WAKEFIELD BR	82%	2014/15
Wakefield Kirkgate	WAKEFIELD BR	18%	2014/15
Canterbury East	CANTERBURY BR	30%	2014/15
Canterbury West	CANTERBURY BR	70%	2014/15
Falkirk Grahamston	FALKIRK BR	44%	2014/15
Falkirk High	FALKIRK BR	56%	2014/15
Helensburgh Central	HELENSBURGH BR	98%	2014/15
Helensburgh Upper	HELENSBURGH BR	2%	2014/15
Southend Central	SOUTHEND BR	46%	2015/16
Southend Victoria	SOUTHEND BR	28%	2015/16
Southend East	SOUTHEND BR	26%	2015/16

Station Name	Station Group	Proportions	Year Undertaken
Wigan North Western	WIGAN BR	52%	2015/16
Wigan Wallgate	WIGAN BR	48%	2015/16
Folkestone Central	FOLKESTONE BR	57%	2018/19
Folkestone West	FOLKESTONE BR	43%	2018/19
Hertford East	HERTFORD BR	51%	2018/19
Hertford North	HERTFORD BR	49%	2018/19
Guildford	GUILDFORD BR	88%	2018/19
London Road (Guildford)	GUILDFORD BR	12%	2018/19
Worcester Foregate Street	WORCESTER BR	77%	2019/20
Worcester Shrub Hill	WORCESTER BR	23%	2019/20
Dorchester South	DORCHESTER BR	83%	2019/20
Dorchester West	DORCHESTER BR	17%	2019/20
Warrington Bank Quay	WARRINGTON BR	51%	2019/20
Warrington Central	WARRINGTON BR	49%	2019/20
Edenbridge (Kent)	EDENBRIDGE BR	35%	2019/20
Edenbridge Town	EDENBRIDGE BR	65%	2019/20
Deansgate	MANCHESTER BR	3%	2019/20
Manchester Oxford Road	MANCHESTER BR	13%	2019/20
Manchester Piccadilly	MANCHESTER BR	65%	2019/20
Manchester Victoria	MANCHESTER BR	19%	2019/20

Adjustment for 'Multiflex' issue

1.112 An issue was identified in the 2018/19 statistics with how journeys on the 'Multiflex' ticket (product code 2BRS), used on Transport for Wales (TfW) services, were recorded in LENNON. This product was previously retailed as 6 return tickets, but in P08 of 2018/19 was converted to 12 single tickets. This change was incorrectly reflected in LENNON, with each of the 12 single products being allocated 12 journeys. This meant for the 12 single products, LENNON recorded 144 journeys. It is worth noting that this only affected journeys and not revenue and was corrected in LENNON in P03 of 2019/20. For the 2018/19 statistics, analysis was undertaken on LENNON data to calculate how much each affected flow should be adjusted by and this analysis was replicated for the 2019/20 data.

1.113 For 2019/20, the adjustment resulted in a reduction of 1.9m entries and exits compared with the LENNON base data.

Refunds Adjustments

1.114 In March 2020 the effects of the COVID-19 pandemic started to impact everyday life, with some restrictions being implemented in mid-March 2020 and a national lockdown enforced on 23rd March 2020. This had an enormous effect on rail patronage and transport usage more generally. One impact was that a large proportion of rail users applied for refunds of their season tickets due to the guidance to work from home where possible and to limit transport

usage to essential journeys only. This large volume of season ticket refund requests received by train companies caused a backlog in processing, with these refunds being gradually processed between March and later in 2020.

1.115 This had implications for the calculation of the station usage estimates for 2019/20, because refunded journeys and revenue are settled in LENNON on the date the refund is processed, rather than the date that the request is submitted. This meant 2 adjustments were required to account for the season ticket refunds.

1.116 Firstly, for refund requests that were received and processed in the final weeks of March 2020 (i.e. at the start of the national lockdown), all the refunded journeys and revenue would appear in the 2019/20 financial year when in 'reality' those refunded journeys should be distributed over the season ticket's remaining validity. Therefore, an adjustment was required to remove the proportion of refunded journeys that shouldn't have applied to 2019/20. The adjustment resulted in an increase of 4.26m journeys in the base data.

1.117 The second adjustment related to the refund requests that were processed after March 2020. These refunded journeys would all be allocated to the 2020/21 financial year, whereas it is likely that some of the journeys should be backdated to mid-March 2020 when the national lockdown commenced. This meant that a small proportion of these refunded journeys should be added to the 2019/20 estimates (i.e. the 2019/20 usage figures reduced) and Steer undertook this adjustment by using refunds data from LENNON for the first 5 periods of 2020/21 (i.e. to 22nd August 2020) to calculate the adjustment required for each flow. The adjustment resulted in a decrease of 3.31m journeys in the base data.

1.118 Both adjustments were included in the 2019/20 Station Usage dataset, with no station experiencing more than a 3% change (and the vast majority of stations experiencing an impact of 1% or lower). The two adjustments work in opposite directions (the first removes negative journeys, resulting in an increase in station usage estimates, and the second adds negative journeys, resulting in a decrease in station usage estimates) but at a flow and station level, the adjustments don't fully balance each other out.

Inclusion of Heathrow and Heathrow Express Demand

1.119 Demand to and from Heathrow stations is included in the Station Usage dataset for the first time this year.

1.120 Since the transfer of Heathrow Connect services to TfL operation (in preparation for their inclusion in Crossrail/the Elizabeth Line) in 2018, revenue and journeys to/from the Heathrow rail stations have been included in the MOIRA2.2 matrix. This includes tickets purchased with an origin or destination of one of the 3 Heathrow rail stations (Terminals 2&3, Terminal 4 and Terminal 5) or the station group of Heathrow BR, for travel on TfL Rail services and the LENNON portion of Heathrow Express demand (Heathrow Express is an open-access operator and has sales channels both within and outside of the National Rail LENNON system).

1.121 However, the MOIRA2.2 matrix does not include the non-LENNON portion of Heathrow Express demand. Due to uncertainty regarding the magnitude of the non-LENNON portion (and by extension its impact on estimates of entries and exits), the Heathrow stations were not included in the 2018/19 estimates of station usage.

1.122 For the 2019/20 dataset, Heathrow Express Ltd have provided an estimate of total journeys between Paddington and the Heathrow stations on Heathrow Express services. This data has been apportioned between the individual Heathrow stations using the splits obtained for

LENNON Heathrow Express journeys. This has enabled the Heathrow stations to be included in the Station Usage dataset for this year.

1.123 The total impact of including demand to/from Heathrow stations is an increase of 14.3m (0.48%) entries and exits. The top 20 stations with changes due to including Heathrow demand is shown in Table 1.18 below. As might be expected, the largest increases are shown at the Heathrow stations, London Paddington and other nearby rail stations between Heathrow and London (served by TfL Rail).

Table 1.18: Top 20 stations impacted by inclusion of Heathrow demand

Station	Total Increase in Entries & Exits	% Impact
London Paddington	6,252,282	16.2%
Heathrow Terminals 2 & 3 (Rail Station Only)	3,990,120	n/a
Heathrow Terminal 4 (Rail Station Only)	1,752,096	n/a
Heathrow Terminal 5 (Rail Station Only)	1,461,446	n/a
Ealing Broadway	182,788	2.7%
Southall	163,178	4.9%
Hayes & Harlington	91,184	2.1%
Reading	57,592	0.3%
West Ealing	30,072	2.6%
Woking	23,602	0.3%
Hanwell	23,230	5.3%
Bath Spa	11,032	0.2%
Bristol Temple Meads	9,778	0.1%
Cardiff Central	8,482	0.1%
Maidenhead	8,202	0.2%
Oxford	6,934	0.1%
Plymouth	6,812	0.3%
Cambridge	6,726	0.1%
Exeter St David's	6,444	0.2%
Didcot Parkway	5,750	0.2%

1.124 Including Heathrow demand also has a small impact on the interchange numbers for 2019/20, with a total increase of 12,032 interchanges (0.005% increase). Table 1.19 below shows the stations which have their interchange numbers impacted by including Heathrow demand.

Table 1.19: Stations with interchanges impacted by including Heathrow demand

Station	Total Increase in Interchanges	% Impact
Hayes & Harlington	6,331	10.7%
West Ealing	3,316	5.0%
London Paddington	1,089	0.0%
High Wycombe	647	0.8%
London Marylebone	398	0.0%
Aylesbury	183	1.9%
Ealing Broadway	67	0.3%
Princes Risborough	1	0.0%

'Alternative Dataset' & The Impact of COVID-19

1.125 The effects of the COVID-19 pandemic on rail patronage began to be felt most strongly from mid-March 2020, with the UK being put into national lockdown from 23rd March. To help to understand the extent of the impact of the pandemic on the Station Usage dataset an 'alternative dataset' was developed according to the following methodology.

1.126 As the significant COVID-19 impacts occurred from mid-March 2020, only journeys in the final period of the 2019/20 financial year were materially affected (P13 of 2019/20 was from 1st March 2020 until 31st March 2020). Therefore, an 'alternative dataset' was produced from the 13 periods to P12 of 2019/20 (instead of P13 as in the standard dataset), which should (all other factors being equal) provide a reasonable approximation of what the station usage estimates would have been without the impact of COVID-19 in March 2020.

1.127 A base revenue and journeys matrix using LENNON data for P13 of 2018/19 to P12 of 2019/20 inclusive was used for this purpose. This is equivalent to replacing P13 of the 2019/20 dataset with P13 of 2018/19.

1.128 This 'alternative dataset' can then be used to generate station usage estimates which are as close to the main (financial year) dataset as possible, whilst largely being unaffected by the impact of COIVD-19. These estimates can be compared with the 2019/20 dataset to give an approximate estimate of the impact of COVID-19 at a station and national level.

1.129 The impact of COVID-19 can be estimated by comparing the year-on-year growth with the 2018/19 dataset as shown below:

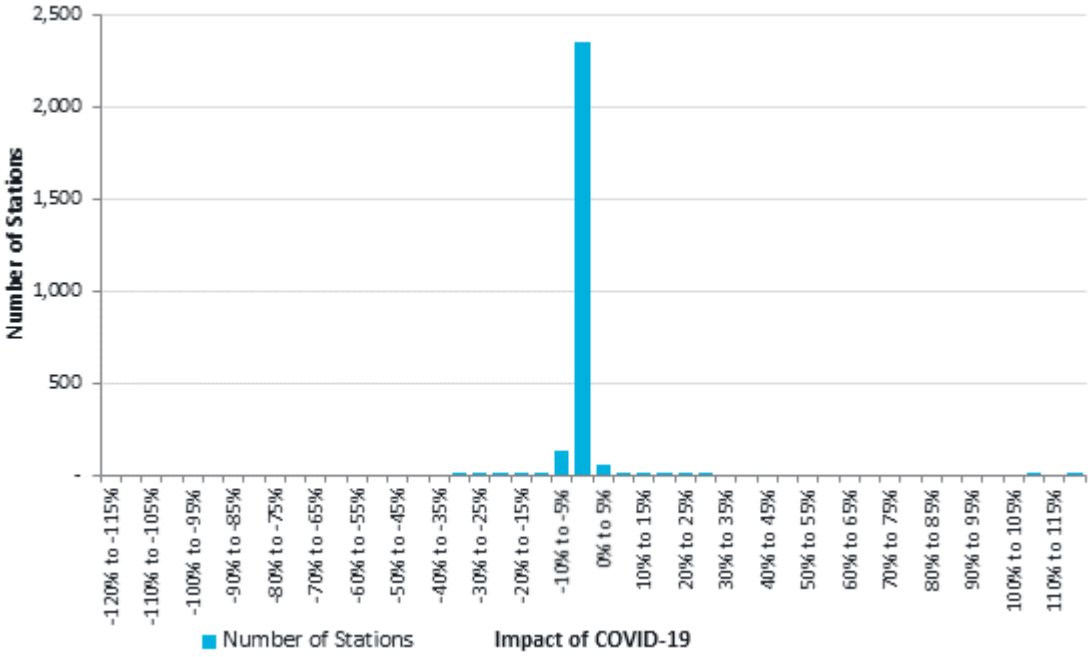
1.130 $$Impact = YoY\%_{1920} - YoY\%_{preCOVID}$$

1.131 Which is equivalent to:

1.132 $$Impact = \frac{SU_{1920} - SU_{1920preCOVID}}{SU_{1819}}$$

1.133 Using this method, the overall impact of COVID-19 on 2019/20 station usage is -3.5%. The vast majority of stations have an impact between 0% and -10%, as shown by the distribution in Figure 1.1.

Figure 1.1: Distribution of the estimated impact of COVID-19 on station usage by station



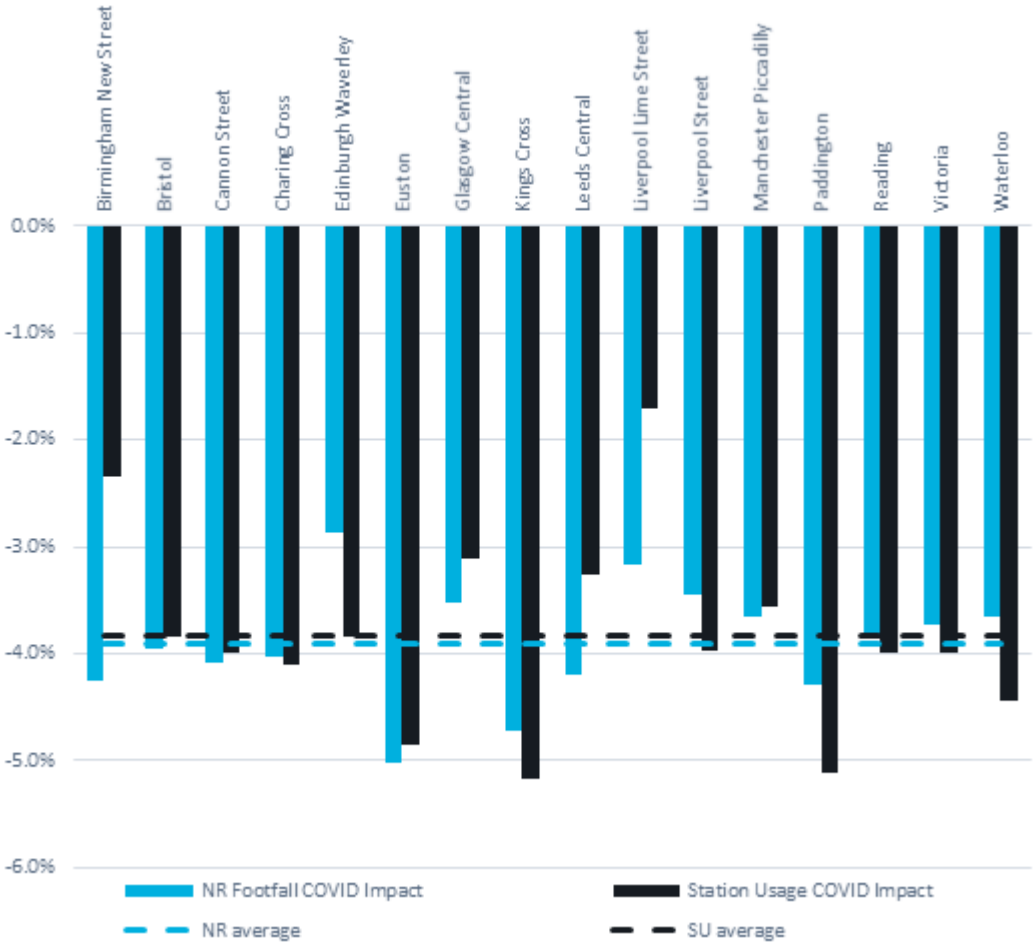
1.134 When using this method to estimate the impact of COVID-19 at a station level, it relies on "all other factors being equal". Where this isn't the case the estimation is less representative of the COVID-19 impact.

1.135 This methodology for estimating an impact of COVID-19 is dependent on the difference between demand in P13 of 2018/19 and 2019/20. In a small number of cases, this difference in demand can be very significant e.g. when there has been significant passenger growth midway through 2019/20, perhaps due to service improvements (which can offset the impact of the national lockdown) or when station or line closures mean usage in March 2020 was very low (obscuring the impact of the lockdown).

1.136 The number of stations affected by these issues is very small as shown by the distribution in Figure 1.1, but consequently there are some stations where a reasonable impact of COVID-19 cannot be calculated using this method.

1.137 For most of their managed stations, Network Rail has provided monthly gateline data, which is a good comparator with the Station Usage dataset. The estimated impact of COVID-19 on annual footfall can be derived in a similar way by calculating the difference in footfall in the year to February 2020 and the year to March 2020, thereby assuring the 'alternative dataset' methodology described above.

Figure 1.2: Comparison of COVID-19 impact for Network Rail and station usage data



1.138 Figure 1.2 shows that the Network Rail impact corresponds well to the 'alternative dataset' methodology described above for estimating the COVID-19 impact on station usage.

Methodological Changes in 2018/19

Key PTE Infill Changes for 2018/19

1.139 Each year, PTE infills are prepared by Steer (West Midlands) and Mott MacDonald (Greater Manchester, Merseyside, South Yorkshire, Tyne and Wear, West Yorkshire).

1.140 These infills are subject to annual improvements, which normally represent a simple update, but some years contain a step change in the methodology.

1.141 For 2018/19, Concessionary ticketing data was available for Greater Manchester PTE for the first time. The table below shows the split of PTE sales by PTE product.

Table 1.20: Summary of TfGM infill change in 2018/19

Ticket Type	2017/18 Journeys	2018/19 Journeys	Abs Change 2017/18-2018/19	% change 2017/18-2018/2019
Traincard	3,387,129	3,479,328	92,199	2.65%
Countycard	1,548,081	1,462,476	-85,605	-5.85%
Wayfarer	126,983	81,438	-45,546	-55.93%
GMPTE Accompanied Child	150,958	125,845	-25,113	-19.96%
DaySaver	53,615	44,454	-9,161	-20.61%
Rail Ranger	12,902	9,078	-3,824	-42.12%
Concessions	0	3,705,977	3,705,977	100.00%
Total	5,279,668	8,908,596	3,628,928	40.74%

1.142 This led to a total increase of 3.6m journeys, or 7.2m entries and exits, split across the Greater Manchester area.

Season ticket journey adjustments

1.143 In the production of previous years' statistics, adjustments were made to account for situations where passengers buy season tickets for travel to/from a station other than the one they generally travel from, in order to allow additional flexibility. This issue and the previous adjustments are described in detail in the accompanying report, Station_Usage_2018_19 – Appendices, Chapter 1.

1.144 In some areas, multiple stations have identically priced season tickets to London. As a result, London season tickets are generally sold as being from the furthest station, regardless of the actual origin station. This means that the ticket sales data shows that there are more people travelling to/from this station than is actually the case.

1.145 LENNON sales data was used to estimate the number of tickets where the issuing office was at a branch line station but the ticket origin showed a station further along a line. In these cases, it was assumed that the journey was actually being made from a point on the branch line and not the recorded origin.

1.146 For the production of the 2018/19 statistics, the analysis underpinning this reallocation was updated with 2018/19 LENNON data. Table 1.21 shows the scale of the adjustments.

Table 1.21: Summary of adjustments in 2018/19

Station TLC	Station Name	Station Group	Adjusted Journeys	Total Journeys
SOV	Southend Victoria	Southend Victoria Branch	-293,456	2,129,590
HOC	Hockley	Southend Victoria Branch	-360,173	724,288
RLG	Rayleigh	Southend Victoria Branch	493,169	1,832,722
RFD	Rochford	Southend Victoria Branch	124,590	615,582
PRL	Prittlewell	Southend Victoria Branch	23,430	220,626
SIA	Southend Airport	Southend Victoria Branch	9,644	611,256
WIC	Wickford	Southend Victoria Branch	2,796	2,261,210
REI	Reigate	Reigate/Redhill	-155,388	1,436,558
RDH	Redhill	Reigate/Redhill	155,388	3,787,090
CHW	Chalkwell	Southend Central Branch	-66,071	1,913,550
BEF	Benfleet	Southend Central Branch	31,435	3,664,766
LES	Leigh-On-Sea	Southend Central Branch	31,361	2,355,650
SOC	Southend Central	Southend Central Branch	3,275	3,446,092
GRV	Gravesend	Gravesend	-55,733	3,087,304
EBD	Ebbsfleet International	Gravesend	55,733	2,106,802
EGR	East Grinstead	East Grinstead/Lingfield	-60,033	1,586,800
LFD	Lingfield	East Grinstead/Lingfield	60,033	503,444
ELD	Earlswood (Surrey)	Earlswood/Redhill	-63,349	404,288
RDH	Redhill	Earlswood/Redhill	63,349	3,787,090
CTM	Chatham	Chatham/Rochester	-58,095	2,730,416
RTR	Rochester	Chatham/Rochester	58,095	2,056,936
HIB	High Brooms	Tonbridge	-12,104	1,256,908
TON	Tonbridge	Tonbridge	-34,225	4,554,198
TBW	Tunbridge Wells	Tonbridge	46,330	3,838,532
GRY	Grays	Thameside	-55,038	4,165,432
CFH	Chafford Hundred Lakeside	Thameside	13,235	2,911,958
OCK	Ockendon	Thameside	20,496	1,160,354
PFL	Purfleet	Thameside	21,307	686,726
GLM	Gillingham (Kent)	Medway	-38,556	2,747,444
CTM	Chatham	Medway	-58,095	2,730,416
RTR	Rochester	Medway	58,095	2,056,936
SOO	Strood (Kent)	Medway	38,556	1,194,020

Demand allocation at Group Stations

1.147 In order to validate and improve the allocation of journeys between stations within groups (e.g. Dorking BR), passenger counts are routinely carried out at selected group stations on the network. The most recent counts were carried out in Autumn 2018/Spring 2019 at the following station groups:

- Brighton Main Line Stations
- Brighton BR

- Canterbury BR
- Colchester BR
- Dorking BR
- Folkestone BR
- Hertford BR
- Portsmouth BR
- Wakefield BR
- Bristol BR
- Exeter BR
- Guildford BR
- Edinburgh BR
- Reading BR

1.148 These counts were used both to validate existing data, and to create or update station group counts splits, with three new sets of station counts splits created. The proportion of journeys split between stations based on routine counts are shown in Table 1.22 below.

Table 1.22: Count-based adjustments to 2018/19 statistics

Station Name	Station Group	Proportions	Year Undertaken
Colchester	COLCHESTER BR	85.0%	2013/14
Colchester Town	COLCHESTER BR	15.0%	2013/14
Bedford	BEDFORD BR	96.0%	2014/15
Bedford St Johns	BEDFORD BR	4.0%	2014/15
Dorchester South	DORCHESTER BR	74.0%	2015/16
Dorchester West	DORCHESTER BR	26.0%	2015/16
Dorking (Deepdene)	DORKING BR	25.0%	2014/15
Dorking (Main)	DORKING BR	72.0%	2014/15
Dorking West	DORKING BR	3.0%	2014/15
Farnborough (Main)	FARNBOROUGH BR	82.0%	2013/14
Farnborough North	FARNBOROUGH BR	18.0%	2013/14
Maidstone Barracks	MAIDSTONE BR	11.0%	2013/14
Maidstone East	MAIDSTONE BR	55.0%	2013/14
Maidstone West	MAIDSTONE BR	34.0%	2013/14
Newark Castle	NEWARK BR	46.0%	2015/16
Newark North Gate	NEWARK BR	54.0%	2015/16
Portsmouth & Southsea	PORTSMOUTH BR	49.0%	2014/15
Portsmouth Harbour	PORTSMOUTH BR	51.0%	2014/15
Wakefield Westgate	WAKEFIELD BR	82.0%	2014/15
Wakefield Kirkgate	WAKEFIELD BR	18.0%	2014/15
Canterbury East	CANTERBURY BR	30.0%	2014/15
Canterbury West	CANTERBURY BR	70.0%	2014/15

Station Name	Station Group	Proportions	Year Undertaken
Edenbridge (Kent)	EDENBRIDGE BR	49.0%	2014/15
Edenbridge Town	EDENBRIDGE BR	51.0%	2014/15
Falkirk Grahamston	FALKIRK BR	44.0%	2014/15
Falkirk High	FALKIRK BR	56.0%	2014/15
Helensburgh Central	HELENSBURGH BR	98.0%	2014/15
Helensburgh Upper	HELENSBURGH BR	2.0%	2014/15
Worcester Foregate Street	WORCESTER BR	72.0%	2015/16
Worcester Shrub Hill	WORCESTER BR	28.0%	2015/16
Southend Central	SOUTHEND BR	46.0%	2015/16
Southend Victoria	SOUTHEND BR	28.0%	2015/16
Southend East	SOUTHEND BR	26.0%	2015/16
Warrington Bank Quay	WARRINGTON BR	44.0%	2015/16
Warrington Central	WARRINGTON BR	56.0%	2015/16
Wigan North Western	WIGAN BR	52.0%	2015/16
Wigan Wallgate	WIGAN BR	48.0%	2015/16
Folkestone Central	FOLKESTONE BR	57.1%	2018/19
Folkestone West	FOLKESTONE BR	42.9%	2018/19
Hertford East	HERTFORD BR	51.1%	2018/19
Hertford North	HERTFORD BR	48.9%	2018/19
Guildford	GUILDFORD BR	88.0%	2018/19
London Road (Guildford)	GUILDFORD BR	12.0%	2018/19

Revision to 2018/19 data for 'Multiflex' issue

1.153 In March 2020 an issue was identified with how journeys on the 'Multiflex' ticket (product code 2BRS), used on Transport for Wales (TfW) services, were recorded in LENNON. This ticket was previously 6 return products, but in P08 of 2018/19 was converted to 12 single products. This change was incorrectly reflected in LENNON, with each of the 12 single products being allocated 12 journeys. This meant for the 12 single products, LENNON recorded 144 journeys. Station usage numbers in Wales (and to a lesser extent some stations in England served by TfW) for 2018/19 were therefore overstated. It is worth noting that this only affected journeys and not revenue and was corrected in LENNON in P01 of 2019/20.ORR asked Steer to adjust the 2018/19 station usage statistics and ODM to account for this error. Analysis was undertaken on LENNON data to calculate how much each affected flow should be adjusted by and hence a revised ODM and station usage dataset were produced and published in June 2020.

1.154 This adjustment resulted in an overall reduction of total station usage of 0.2%, with the region most affected being Wales (8.3% reduction in station usage). This has also explained some of the high growth rates for Welsh stations, for example Rhiwbina previously had a growth rate (vs. 2017/18) of 51% but after the Multiflex adjustment was applied this reduced to 4%.

Methodological Changes in 2017/18

Season ticket journey adjustments

1.155 In the production of previous years' statistics, adjustments were made to account for situations where passengers buy season tickets for travel to/from a station other than the one they generally travel from, in order to allow additional flexibility.

1.156 In some areas, multiple stations have identically priced season tickets to London. As a result, London season tickets are generally sold as being from the furthest station, regardless of the actual origin station. This means that the ticket sales data shows that there are more people travelling to/from this station than is actually the case.

1.157 LENNON sales data was used to estimate the number of tickets where the issuing office was at a branch line station but the ticket origin showed a station further along a line. In these cases, it was assumed that the journey was actually being made from a point on the branch line and not the recorded origin.

1.158 For the production of the 2017/18 statistics, the analysis underpinning this reallocation was updated with 2017/18 LENNON data. Table 1.23 shows the scale of the adjustments.

Table 1.23: Summary of adjustments in 2017/18

Station TLC	Station Name	Station Group	Adjusted Journeys	Total Journeys
EGR	East Grinstead	Southern Branches	-107,520	1,514,562
ECR	East Croydon	Southern Branches	1,707	23,634,208
DMS	Dormans	Southern Branches	6,831	111,060
PUR	Purley	Southern Branches	1,724	3,076,294
OXT	Oxted	Southern Branches	1,707	1,571,614
LFD	Lingfield	Southern Branches	93,845	546,656
HUR	Hurst Green	Southern Branches	1,707	662,178
CBG	Cambridge	Cambridge Area	-93,381	11,530,238
WLF	Whittlesford	Cambridge Area	14,371	538,972
NWE	Newport (Essex)	Cambridge Area	8,374	184,798
GRC	Great Chesterford	Cambridge Area	1,196	109,116
AUD	Audley End	Cambridge Area	64,655	1,011,626
SED	Shelford (Cambs)	Cambridge Area	4,784	204,618
SOE	Southend East	Southend (C2C)	-114,783	1,926,846
WCF	Westcliff	Southend (C2C)	145,971	1,299,104
SOC	Southend Central	Southend (C2C)	-44,483	3,396,030
LES	Leigh-On-Sea	Southend (C2C)	1,827	2,232,070
CHW	Chalkwell	Southend (C2C)	4,237	1,968,412
BEF	Benfleet	Southend (C2C)	4,820	3,680,038
PSE	Pitsea	Southend (C2C)	2,412	1,270,792
BTN	Brighton	Brighton Area	-118,565	16,928,828
HHE	Haywards Heath	Brighton Area	2,818	4,392,522
PRP	Preston Park	Brighton Area	90,356	503,650

Station TLC	Station Name	Station Group	Adjusted Journeys	Total Journeys
WVF	Wivelsfield	Brighton Area	5,645	444,326
BUG	Burgess Hill	Brighton Area	19,746	1,819,774
REI	Reigate	Reigate/Redhill	-64,921	1,223,378
RDH	Redhill	Reigate/Redhill	206,831	3,553,742
MHM	Merstham	Reigate/Redhill	4,218	662,836
GTW	Gatwick Airport	Reigate/Redhill	-120,870	20,328,212
HOR	Horley	Reigate/Redhill	88,655	971,834
SAF	Salfords (Surrey)	Reigate/Redhill	12,123	136,576
XDK	Dorking BR	Reigate/Redhill	-126,037	1,791,772

Demand allocation at Group Stations

1.159 In order to validate and improve the allocation of journeys between stations within groups (e.g. Worcester BR), passenger counts are routinely carried out at selected group stations on the network. The most recent counts were carried out in Autumn 2017 at the following station groups:

- Bicester BR;
- Farnborough BR;
- Southend BR;
- Birmingham BR;
- Worcester BR;
- Warrington BR;
- Wigan BR.

1.160 These counts effectively validated existing data, and the counts splits for all group stations were maintaining as they were in previous years. The proportion of journeys split between stations based on routine counts are shown in Table 1.24 below.

Table 1.24: Count-based adjustments to 2017/18 statistics

Station Name	Station Group	Proportions	Year Undertaken
Colchester	COLCHESTER BR	85.0%	2013/14
Colchester Town	COLCHESTER BR	15.0%	2013/14
Bedford	BEDFORD BR	96.0%	2014/15
Bedford St Johns	BEDFORD BR	4.0%	2014/15
Dorchester South	DORCHESTER BR	74.0%	2015/16
Dorchester West	DORCHESTER BR	26.0%	2015/16
Dorking (Deepdene)	DORKING BR	25.0%	2014/15
Dorking (Main)	DORKING BR	72.0%	2014/15
Dorking West	DORKING BR	3.0%	2014/15
Farnborough (Main)	FARNBOROUGH BR	82.0%	2013/14
Farnborough North	FARNBOROUGH BR	18.0%	2013/14
Hertford East	HERTFORD BR	37.0%	2013/14
Hertford North	HERTFORD BR	63.0%	2013/14

Station Name	Station Group	Proportions	Year Undertaken
Maidstone Barracks	MAIDSTONE BR	11.0%	2013/14
Maidstone East	MAIDSTONE BR	55.0%	2013/14
Maidstone West	MAIDSTONE BR	34.0%	2013/14
Newark Castle	NEWARK BR	46.0%	2015/16
Newark North Gate	NEWARK BR	54.0%	2015/16
Portsmouth & Southsea	PORTSMOUTH BR	49.0%	2014/15
Portsmouth Harbour	PORTSMOUTH BR	51.0%	2014/15
Wakefield Westgate	WAKEFIELD BR	82.0%	2014/15
Wakefield Kirkgate	WAKEFIELD BR	18.0%	2014/15
Canterbury East	CANTERBURY BR	30.0%	2014/15
Canterbury West	CANTERBURY BR	70.0%	2014/15
Edenbridge (Kent)	EDENBRIDGE BR	49.0%	2014/15
Edenbridge Town	EDENBRIDGE BR	51.0%	2014/15
Falkirk Grahamston	FALKIRK BR	44.0%	2014/15
Falkirk High	FALKIRK BR	56.0%	2014/15
Helensburgh Central	HELENSBURGH BR	98.0%	2014/15
Helensburgh Upper	HELENSBURGH BR	2.0%	2014/15
Worcester Foregate Street	WORCESTER BR	72.0%	2015/16
Worcester Shrub Hill	WORCESTER BR	28.0%	2015/16
Southend Central	SOUTHEND BR	46.0%	2015/16
Southend Victoria	SOUTHEND BR	28.0%	2015/16
Southend East	SOUTHEND BR	26.0%	2015/16
Warrington Bank Quay	WARRINGTON BR	44.0%	2015/16
Warrington Central	WARRINGTON BR	56.0%	2015/16
Wigan North Western	WIGAN BR	52.0%	2015/16
Wigan Wallgate	WIGAN BR	48.0%	2015/16
Bicester North	BICESTER BR	48.3%	2016/17
Bicester Village	BICESTER BR	51.7%	2016/17
Birmingham New Street	BIRMINGHAM BR	78.5%	2016/17
Birmingham Moor Street	BIRMINGHAM BR	11.2%	2016/17
Birmingham Snow Hill	BIRMINGHAM BR	10.3%	2016/17

1.161 Note that these counts-based splits are only applied to the Station Usage dataset, not the ODM.

Methodological Changes in 2016/17

London BR allocation update

1.162 In the production of the 2015/16 statistics, there were a number of journeys included in the underlying MOIRA 2.2 matrix with both an origin and a destination of "London BR". The methodology used to assign BR>BR flows uses LENNON sales data to allocate journeys according to where journeys outbound from the BR stations are travelling. Investigation showed that due to the limited ticket data for London BR > Individual London Terminal flows, a large proportion of the journeys were being allocated to Kensington Olympia leading to an overstatement of journeys at that station.

Table 1.25: London BR > Individual London BR stations LENNON data (2016/17)

Origin Code	Origin Name	Destination Code	Destination Name	Issues (*)[2]	Proportion of issues
1072	LONDON BR	5143	CHARING CROSS LONDON	4	0%
1072	LONDON BR	577	FARRINGDON	5	0%
1072	LONDON BR	1555	ST PANCRAS LONDON	10	1%
1072	**LONDON BR**	**3092**	**KENSINGTON OLYMPIA**	**982**	**97%**
1072	LONDON BR	5597	VAUXHALL LONDON	1	0%
1072	LONDON BR	5142	CANNON STREET LONDON	20	2%

1.163 The majority of London BR > Individual London Terminal issues recorded in LENNON in 2016/17 were between London BR and Kensington Olympia, noting that this is a very small number of issues in total and therefore not necessarily representative of the actual pattern of demand. Nonetheless, this result was being used to allocate c.2.2m London BR > London BR journeys in the underlying MOIRA2.2 matrix, with the majority of these c.2.2m journeys being attributed to flows involving Kensington Olympia flows.

1.164 In order to resolve the above issue, London BR > London BR demand has been allocated to individual London Terminal > London Terminal flows in line with the underlying MOIRA2.2 journeys between individual London Terminals. The 'Any Permitted' route code was used as the basis of the allocation. For example, if 1.5% of London Terminal > London Terminal journeys on the 'Any Permitted' route code are from Charing Cross to London Bridge, then 1.5% of the London BR > London BR journeys are allocated to this flow.

1.165 The journeys are also adjusted to remove all of the London BR > London BR journeys, therefore none are allocated using the LENNON process described above.

Table 1.26: Allocation of London BR > London BR journeys between London Terminals

[2] Only showing stations with 1 or more issue

Journeys	Input	Output
London BR	2,163,279	-
Blackfriars	-	108,230
Charing Cross	-	131,309
Cannon Street	-	49,257
City Thameslink	-	78,866
Elephant & Castle	-	46,831
Euston	-	39,392
Fenchurch Street	-	13,452
King's Cross	-	28,325
Kensington Olympia	-	21,262
London Bridge	-	179,001
Liverpool Street	-	102,498
Moorgate	-	145,513
Marylebone	-	23,939
Paddington	-	44,934
St.Pancras	-	157,414
Victoria	-	157,552
Vauxhall	-	242,989
Waterloo (East)	-	93,466
Waterloo	-	405,273
Farringdon	-	93,775
Total	**2,163,279**	**2,163,279**

1.166 The most obvious impact of this change is that there is a decrease in recorded usage at Kensington Olympia, noting that this is a methodological change and does not imply an actual drop in the number of passengers using the station. The effect is less noticeable at the other London Terminals as the impact is spread between them, and the overall levels of usage are very high.

Season ticket journey adjustments

1.167 In the production of the 2014/15 and 2015/16 statistics, adjustments were made to account for situations where passengers buy season tickets for travel to/from a station other than the

one they generally travel from, in order to allow additional flexibility. This issue and the previous adjustments are described in detail in Appendix A but for clarity we consider the case of Southend Victoria here as an example.

1.168 On the southern fork of the Shenfield to Southend branch line which links Southend Victoria to Wickford and the Great Eastern Mainline there are a number of stations (Rayleigh, Hockley, Rochford, Southend Airport, Prittlewell and Southend Victoria) where the season ticket price to London is the same. As a result London season tickets are generally sold as being from Southend Victoria, regardless of the actual origin station. This means that the ticket sales data shows that there are more people travelling to/from Southend Victoria than is actually the case as there are passengers travelling from Prittlewell with Southend Victoria tickets, for example.

1.169 In order to account for this, LENNON sales data was used to estimate the number of tickets with Southend Victoria as the origin, but with the issuing office at one of the branch line stations. In these cases, it was assumed that the journey was actually being made from a point on the branch line and not from Southend Victoria.

1.170 For the production of the 2016/17 statistics, the analysis underpinning this reallocation was updated with 2016/17 LENNON data. Table 1.27 shows the scale of the adjustments, alongside the adjustment used in the 2015/16 statistics for comparison. In the case of Southend Victoria circa 837k journeys are redistributed to other stations on the branch line. This is a lower level of adjustment than what was used in the 2015/16 statistics due to the lower number of journeys assumed to be actually from other stations on the branch.

Table 1.27: Summary of adjustments in 2015/16 and 2016/17

TLC	Station	Adjustment to Entries & Exits (2015/16)	Adjustment to Entries & Exits (2016/17)	2016/17 Statistics with adjustment
SOV	Southend Victoria	-1,100,624	-837,043	1,877,587
RLG	Rayleigh	622,997	457,897	1,819,832
HOC	Hockley	338,473	264,199	960,116
RFD	Rochford	106,813	81,660	566,656
PRL	Prittlewell	20,672	19,163	209,708
SIA	Southend Airport	11,669	14,124	395,646
CHW	Chalkwell	-362,927	-369,670	1,562,918
BEF	Benfleet	254,019	266,759	3,844,366
LES	Leigh-On-Sea	108,908	102,912	2,341,028
REI	Reigate	-249,763	-218,053	1,193,556
RDH	Redhill	341,963	369,247	3,705,282
SOU	Southampton Central	-180,076	-151,582	6,361,392
SOA	Southampton Airport (Parkway)	180,076	151,582	1,842,710
SOE	Southend East	-130,909	-122,592	1,723,876
WCF	Westcliff	138,748	144,391	1,259,800
SOC	Southend Central	-7,839	-21,799	3,038,301

TLC	Station	Adjustment to Entries & Exits (2015/16)	Adjustment to Entries & Exits (2016/17)	2016/17 Statistics with adjustment
OXF	Oxford	-323,461	-356,311	6,631,498
DID	Didcot Parkway	323,461	356,311	3,554,204
EGR	East Grinstead	-135,262	-139,974	1,437,882
LFD	Lingfield	114,776	126,838	573,218
DMS	Dormans	20,486	13,136	111,430
GTW	Gatwick Airport	-101,175	-125,058	19,361,658
HOR	Horley	90,686	91,727	923,774
SAF	Salfords (Surrey)	3,499	12,543	125,372
XDK	Dorking BR	-85,210	-130,404	1,616,384
BTN	Brighton	-110,157	-88,372	15,993,072
PRP	Preston Park	110,157	88,372	527,116

Updated demand allocation at Group Stations

1.171 In order to validate and improve the allocation of journeys between stations within groups (e.g. Worcester BR), passenger counts have been carried out at selected group stations on the network. These counts were carried out in Autumn/Winter 2016 and have informed the allocation of demand at the following station groups:

- Dorchester BR;
- Newark BR;
- Southend BR;
- Warrington BR;
- Wigan BR; and
- Worcester BR.

1.172 The impact of updating these allocations is shown in the table below.

Table 1.28: Count-based adjustments to 2016/17 statistics

NLC	TLC	Station Name	Station Group	Entries + Exits (2016/17, with 2015/16 proportions)	Entries + Exits (2016/17) (with updated proportions)	Entries + Exits (2016/17) (change)
5961	DCH	Dorchester South	DORCHESTER BR	488,170	459,273	-28,897
5962	DCW	Dorchester West	DORCHESTER BR	136,100	164,997	28,897
6498	NCT	Newark Castle	NEWARK BR	583,847	752,394	168,547
6499	NNG	Newark North Gate	NEWARK BR	1,069,371	900,824	-168,547
7420	SOV	Southend Victoria	SOUTHEND BR	1,518,874	1,877,587	358,713
7456	SOC	Southend Central	SOUTHEND BR	3,262,861	3,038,301	-224,560
7457	SOE	Southend East	SOUTHEND BR	1,858,030	1,723,876	-134,153

2384	WBQ	Warrington Bank Quay	WARRINGTON BR	1,176,772	1,363,569	186,797
2390	WAC	Warrington Central	WARRINGTON BR	1,916,674	1,729,877	-186,797
2363	WGN	Wigan North Western	WIGAN BR	1,466,006	1,620,278	154,272
2406	WGW	Wigan Wallgate	WIGAN BR	1,647,580	1,493,308	-154,272
4891	WOS	Worcester Shrub Hill	WORCESTER BR	620,041	818,070	198,029
4893	WOF	Worcester Foregate Street	WORCESTER BR	2,298,855	2,100,826	-198,029

1.173 Note that these counts based splits are only applied to the Station Usage dataset, not the ODM.

Methodological Changes in 2015/16

London (In-boundary) Travelcard Methodology

1.174 In previous years, London Travelcard journeys were allocated using LATS (London Area Travelcard Survey) data from 2001. This methodology is described in detail in Appendix D. For the 2015/16 production of the MOIRA2.2 dataset, Resonate were able to use data from TfL's Oyster Clicks Model (OCM) to allocate in-boundary[3] Travelcard journeys to individual London stations. In previous productions of the statistics, Travelcard journeys were all assigned to the "London BR" code and then allocated according to the LATS data as with other journeys.

1.175 Travelcard journeys partly outside the London Travelcard Area (out-boundary) were allocated as in previous years using the LATS data.

1.176 As a result of these methodological changes, there were a large number of significant changes to estimated usage at stations within the London Travelcard Area. This in general has re-allocated some journeys that would have previously been to central London terminals to stations outside Zone 1, for example those stations on the London Overground network. When using the 2015/16 statistics it should be noted that this significant methodological change has taken place and therefore a direct calculation of growth between 2014/15 and 2015/16 using the published figures at London stations will not necessarily reflect underlying growth. For this reason, an additional field, "*Estimated absolute change in Usage due to 2015/16 London Travelcard Methodology*", was included so that users can identify where the methodological change is impacting results.

1.177 It should be noted that due to the complex processing and estimation techniques used to calculate this additional field, there are a number of non-London stations which have a small number of entries and exits associated with the London Travelcard Methodology change. These small differences are largely due to estimation approach used, rather than having actually been affected by the London Travelcard Methodology change.

1.178 Table 1.29 shows the top 10 increases (ranked by absolute number of entries + exits) due to the London Travelcard Methodology change. Table 1.30 shows the equivalent for decreases due to the change. The large increases are centred around stations outside of Zone 1, which have experienced large increases in traffic since the collection of the survey data that was previously used to allocated Travelcard journeys. The large decreases are therefore centred

[3] Journeys wholly within the London Travelcard Area

mostly on the large Zone 1 terminals, which are likely to have had a higher proportion of usage when the survey took place.

Table 1.29: Top 10 increases in usage due to London in-boundary Travelcard methodology

Increase Rank	Station name	2015/16 Entries & Exits under previous methodology	2015/16 Entries & Exits under updated methodology	Percentage change due to methodology
1	Canada Water	13,802,077	23,643,842	71.3%
2	Stratford	33,903,520	41,113,260	21.3%
3	Highbury & Islington	22,646,684	28,166,440	24.4%
4	Whitechapel	8,608,391	13,996,988	62.6%
5	Clapham Junction	28,641,908	32,282,220	12.7%
6	Shepherds Bush	5,106,387	8,653,428	69.5%
7	West Ham	6,344,402	8,778,194	38.4%
8	Balham	7,731,554	10,114,526	30.8%
9	Barking	11,113,389	13,428,608	20.8%
10	Shoreditch High Street	5,379,586	7,661,254	42.4%

Table 1.30: Top 10 decreases in usage due to London in-boundary Travelcard methodology

Decrease Rank	Station name	2015/16 Entries & Exits under previous methodology	2015/16 Entries & Exits under updated methodology	Percentage change due to methodology
1	Charing Cross	34,678,162	28,998,152	-16.4%
2	Waterloo	104,121,285	99,148,388	-4.8%
3	Blackfriars	14,489,288	10,467,646	-27.8%
4	Euston	45,196,881	41,677,870	-7.8%
5	Liverpool Street	69,835,807	66,556,690	-4.7%
6	Putney	11,644,951	9,028,596	-22.5%
7	London Bridge	56,120,914	53,850,938	-4.0%
8	Queen's Park (Gt London)	4,964,576	3,001,396	-39.5%
9	Kensington Olympia	12,842,773	10,904,840	-15.1%
10	Cannon Street	23,155,435	21,242,364	-8.3%

London Terminals Demand Allocation

1.179 For the 2015/16 statistics, the MOIRA2.2 input data was disaggregated by individual London Terminal where possible (for example when a ticket is bought to a specific London Terminal rather than the generic 'London BR' destination). This gives an improved reflection of journey origins and destinations.

1.180 Table 1.31 shows the changes to the base journeys in 2015/16 compared to 2014/15. Where information is available to link journeys to specific terminals, this has been done, with the remainder associated with 'London BR' and allocated as in previous years.

1.181 As discussed, journeys associated with London Travelcards have been allocated to individual stations or 'London BR', therefore there are no journeys associated with London Travelcards. As the new London Travelcard Methodology allocates more journeys to smaller stations and less to the London Terminals than the previous methodology, the net number of journeys associated with London Terminals is lower than in 2014/15. It is important to note that this change is due to methodology and does not necessarily imply that journeys at London Terminals are lower than in 2014/15.

Table 1.31: Changes to London Terminal base journeys

Origin or Destination	2014/15 Base journeys (millions)	2015/16 Base journeys (millions)
London BR	377.6	302.6
London Travelcards	283.3	-
Blackfriars	-	5.9
Charing Cross	-	15.6
Cannon Street	-	11.4
City Thameslink	-	4.3
Euston	-	9.2
Farringdon	-	8.5
Fenchurch Street	-	6.5
King's Cross	-	4.6
London Bridge	-	36.8
Liverpool Street	-	35.4
Moorgate	-	6.4
Marylebone	-	4.4
Paddington	-	9.3
St.Pancras	-	7.8
Victoria	-	56.4
Waterloo (East)	-	7.6
Waterloo	-	55.5

Origin or Destination	2014/15 Base journeys (millions)	2015/16 Base journeys (millions)
Total	**660.9**	**551.2**

Season ticket journey adjustments

1.182 In the production of the 2014/15 statistics, an adjustment was implemented on the allocation of passenger demand at stations around Southend, as analysis of LENNON data revealed that season tickets issued for travel to/from Southend Victoria <> London were actually being used to travel from alternative stations on the branch (see paragraph 591.205). This adjustment was updated and expanded to include additional stations where this issue was present.

1.183 The stations adjusted in the 2015/16 statistics were chosen through a combination of consultation with Train Operating Companies (TOCs) and analysis of LENNON sales data and therefore do not represent a definitive list of issues such as this on the GB rail network. Table 1.32 shows the stations that have been adjusted for the 2015/16 published statistics.

Table 1.32: Stations where Season ticket adjustments made (2015/16)

Station Group	Source	Diagnosis
Southend Victoria / Southend East / Rayleigh / Hockley	Previously adjusted (2014/15 statistics)	
Gatwick Airport / Horley / Redhill / Salfords	Reigate, Redhill and District Users' Association and Govia Thameslink Railway (GTR)	Large number of tickets for travel to/from Reigate bought at other stations
Reigate/ Redhill		
Dorking / Redhill / Reigate		
Brighton / Preston Park	Southern	Large number of tickets for travel to/from Brighton bought at Preston Park.
Oxford / Didcot Parkway	Great Western Railway (GWR) Analysis of LENNON data	Large number of tickets for travel to/from Oxford bought at Didcot Parkway.
Southampton Central / Southampton Parkway	Analysis of LENNON data	Large number of tickets for travel to/from Southampton Central bought at Southampton Parkway.
Chalkwell / Benfleet / Leigh-on-Sea	Analysis of LENNON data	Large number of tickets for travel to/from Chalkwell bought at other stations
East Grinstead / Lingfield / Dormans	Analysis of LENNON data	Large number of tickets for travel to/from East Grinstead bought at other stations

Southend Victoria and Southend Central

1.184 The original adjustment made to the 2014/15 statistics was updated to reflect the improved methodology made in 2015/16. It is important to note that a number of improvements have been made to the 2014/15 figures which explain the large differences observed.

1.185 The new methodology assumes that journeys are only reallocated for journeys via a specific route. For example, journeys were only reallocated on the 'via Romford' route among stations on the Southend Victoria branch. This results in fewer journeys being reallocated than under the methodology used in the 2014/15 statistics, but is more consistent with that used for

other stations. This is an important improvement as it ensures that journeys are not allocated to other routes.

1.186 A calculation error relating to the allocation of Travelcard journeys under the previous (2014/15) methodology was identified, leading to an overstatement of Rochford and Prittlewell journeys and an understatement of Hockley journeys. This is estimated to have resulted in an overstatement of circa +120k journeys at Rochford (c.17% of 2014/15 usage), +225k journeys at Prittlewell (c.53% of 2014/15 usage), and an understatement of -100k journeys at Hockley (c.10% of 2014/15 usage). The effect on other stations is less than 50k journeys. The 2014/15 Station Usage figures were therefore updated for these stations in the 2015/16 Station Usage dataset.

Southend East

1.187 This was the second original adjustment made to the 2014/15 statistics, which was updated with this improved methodology. This update involved reallocating journeys from Southend East to Southend Central. Previously the only reallocation was Southend East > Westcliff and Southend Central > Westcliff. Under the new methodology, the reallocation is Southend East > Westcliff; Southend Central > Westcliff; and Southend East > Southend Central. This reduces the net number of journeys being reallocated away from Southend Central.

1.188 A summary of the 2014/15 and adjusted 2015/16 statistics is shown in Table 1.33.

Table 1.33: Comparison of 2014/15 and 2015/16 statistics

Station	2014/15 published statistics	2015/16 Statistics (adjusted)
Southend Victoria	1,358,773	1,439,480
Rayleigh	1,864,064	1,949,600
Hockley	968,690	1,034,488
Rochford	700,214	596,634
Prittlewell	424,804	195,870
Southend Airport	520,734	425,160
Southend East	1,662,180	1,760,908
Southend Central	2,918,931	3,092,306
Westcliff	1,109,380	1,175,528

Dorking/Gatwick Airport/Reigate

1.189 Following the publication of the 2014/15 statistics, the Reigate, Redhill and District Users' Association raised a potential issue around passengers purchasing season tickets from Dorking / Gatwick Airport to London, rather than from Redhill to London. This anomaly is due to ticket prices being similar or cheaper from Dorking / Gatwick Airport than from Redhill, despite the fact that travel from Redhill is valid on such tickets. The Users' Association stated that based on their surveys, 26% of passengers at Redhill were travelling on Gatwick or Dorking season tickets. The procedure described above was carried out to reallocate journeys on season tickets away from Gatwick Airport and Dorking in proportion to where standard-class annual Season tickets were purchased.

1.190 In the evaluation of instances where a large number of tickets were bought at non-origin stations, a large number of Redhill tickets were identified as being bought at Reigate. Given the annual ticket prices are identical for the 'Any Permitted' route, there is reason to believe that passengers are purchasing Seasons from Reigate rather than Redhill in order to get added flexibility. An additional adjustment was therefore made to Reigate season journeys.

Brighton/Preston Park

1.191 The consultation with train operators highlighted numerous examples of stations with identical season ticket prices along the south coast. For this initial exercise one such example (Preston Park), was examined where season tickets to London are the same price as they are from Brighton. Given that having the flexibility to travel into Brighton as well as London is attractive to passengers, journeys were reallocated between these stations.

Oxford/Didcot Parkway

1.192 The consultation with Passenger Demand Forecasting Council (PDFC) members (supported by analysis) highlighted that Season tickets from Oxford to London cost the same as Season tickets from Didcot Parkway to London. Given that having the flexibility to travel into Oxford as well as London is attractive to passengers, a reallocation of journeys between these stations was considered appropriate.

Southampton Central/Southampton Parkway

1.193 Season tickets to London are marginally cheaper from Southampton Central (£5,324)[4] than Southampton Airport (Parkway) (£5,404), despite Southampton Airport being closer to London. It is therefore plausible that passengers buy Southampton Central tickets even though they regularly travel from Southampton Airport (Parkway) so that they have the flexibility to travel into Southampton. A reallocation of journeys was therefore considered appropriate.

Chalkwell/Benfleet/Leigh-on-Sea

1.194 Chalkwell station is in the suburban area surrounding Southend, directly adjacent to the beach. Season tickets from Benfleet and Leigh-on-Sea to London cost the same as tickets from Chalkwell to London. Given that there are car parks at Benfleet and Leigh-on-Sea, it is conceivable that season ticket holders use this station to access the beach/town at weekends.

East Grinstead/Lingfield/Dormans

1.195 Season tickets to London from East Grinstead cost the same as tickets to London from Lingfield and Dormans. Given that East Grinstead is the largest town close to Lingfield and Dormans, it is reasonable that passengers would find the flexibility of travel to East Grinstead attractive.

Summary

1.196 Table 1.34 shows a summary of the approximate difference to the final entries and exits made by this series of adjustments by station.

[4] Prices for 12-month season – Any Permitted route. Source: National Rail Enquiries **http://ojp.nationalrail.co.uk/service/seasonticket/search** [Accessed: 10/10/2016]

Table 1.34: Summary of adjustments

TLC	Station	Adjustment to Entries & Exits	2015/16 Statistics without adjustment	2015/16 Statistics with adjustment
SOV	Southend Victoria	-1,100,624	2,540,104	1,439,480
RLG	Rayleigh	622,997	1,326,603	1,949,600
HOC	Hockley	338,473	696,015	1,034,488
RFD	Rochford	106,813	489,821	596,634
PRL	Prittlewell	20,672	175,198	195,870
SIA	Southend Airport	11,669	413,491	425,160
CHW	Chalkwell	-362,927	1,897,547	1,534,620
BEF	Benfleet	254,019	3,469,059	3,723,078
LES	Leigh-On-Sea	108,908	2,097,546	2,206,454
REI	Reigate	-249,763	1,568,763	1,319,000
RDH	Redhill	341,963	3,547,717	3,889,680
SOU	Southampton Central	-180,076	6,539,768	6,359,692
SOA	Southampton Airport Parkway	180,076	1,639,356	1,819,432
SOE	Southend East	-130,909	1,891,817	1,760,908
WCF	Westcliff	138,748	1,036,780	1,175,528
SOC	Southend Central	-7,839	3,100,145	3,092,306
OXF	Oxford	-323,461	6,888,139	6,564,678
DID	Didcot Parkway	323,461	3,133,219	3,456,680
EGR	East Grinstead	-135,262	1,662,082	1,526,820
LFD	Lingfield	114,776	501,132	615,908
DMS	Dormans	20,486	104,690	125,176
GTW	Gatwick Airport	-101,175	18,130,021	18,028,846
HOR	Horley	90,686	985,324	1,076,010
SAF	Salfords (Surre)	3,499	128,909	132,408
XDK	Dorking BR	-85,210	1,784,780	1,699,570
BTN	Brighton	-110,157	17,443,483	17,333,326
PRP	Preston Park	110,157	457,843	568,000

Count-based allocation of Ranger products on the St Ives Bay line

1.197 A large number of journeys on the St. Ives Bay line are made using Ranger/Rover tickets, which allow for flexible travel between any stations on the line. In previous years, journeys have been allocated to specific origins and destinations using point-of-purchase sales data. This does not allow for a robust link to be made between journeys and origins as most stations on the branch do not have ticket offices, and a large number of tickets are sold by on-platform staff which are not always recorded as a geographic location. Consequently, the ORR commissioned passenger counts to be carried out on the line in order to better allocate journeys to geographic locations. These counts were carried out between Monday 1st and Sunday 7th August 2016, in order to capture peak summer demand on the line.

1.198 The counts were used to allocate journeys associated with sales of St Ives Ranger tickets where there was not a physical location for the sale. This was done by allocating journeys to origins according to the proportion of entries and exits at each station implied by the count data.

1.199 The splits of Ranger/Rover journeys only (i.e. not including the point to point journeys) from the new methodology are shown in Table 1.35. There is a noticeable reduction in the allocation of demand to Carbis Bay. This is due to a larger proportion of point-to-point journeys having Carbis Bay as an origin than is implied by the usage observed in the survey. The opposite is true for St.Ives, Lelant Saltings, and St.Erth. Lelant shows low usage in both the survey and the MOIRA2.2 data.

1.200 Table 1.35 shows the entries and exits on the St.Ives Bay line as reported in the 2014/15 statistics and the 2015/16 figures incorporating the changes discussed in this section. The entries and exits associated with the Ranger ticket infills are shown separately for comparison. It should be noted that while the infill associated with Lelant is relatively small compared to the other stations, it has a noticeable effect on the final station usage numbers as under the previous infill methodology no journeys were associated to Lelant.

1.201 The table includes a percentage growth between 2014/15 and 2015/16 reported entries and exits but it needs to be borne in mind that this is a mixture of underlying growth and the methodology change.

Table 1.35: St Ives bay line entries + exits in 2014/15 and 2015/16

Station	2014/15 Infill	2014/15 Total demand	2015/16 Infill	2015/16 Total demand	%age 2014/15 – 2015/16
St Ives (Cornwall)	329,676	**638,754**	360,684	**657,750**	3.0%
Carbis Bay	149,908	**231,800**	106,611	**191,408**	-17.4%
Lelant	508	**2,874**	6,291	**8,104**	182.0%
Lelant Saltings	91,094	**116,798**	103,034	**125,064**	7.1%
St Erth	101,045	**204,806**	157,540	**257,802**	25.9%

PTE Infills

1.202 In the production of the 2015/16 dataset it was identified that some products (specifically add-on tickets associated with local Metros and Airport links) that formed part of the infill were already included in the MOIRA2.2 dataset. For the 2015/16 dataset these products have been

removed from the PTE infills to ensure they are not double-counted. The relevant products are:

- Leeds-Bradford Airport bus link products;
- Manchester Metrolink add-on products;
- Liverpool Airport bus link products;
- Tyne & Wear Metro (incl. Newcastle Airport) add-on products; and
- Strathclyde Airport, Ferry, and Glasgow Subway add-on products.

1.203 There were a total of 983,707 journeys associated with these products in the 2015/16 statistics. Under the previous methodology station usage would have been overstated by approximately this amount. Whilst this represents a very small number of journeys in aggregate, due to the nature of the products there is a more significant impact on specific stations. The top ten stations affected are shown in Table 1.36 (ranked in order of percentage change from removing these products).

Table 1.36: Approximate impact of removing double-counted infill products

Rank	Station Name	Published 2015/16 statistics	Estimated 2015/16 usage if double counting was included	Percentage reduction due to removing double counting
1	Prestwick International Airport	93,026	142,599	-34.8%
2	Altrincham	507,592	685,253	-25.9%
3	Ardrossan Harbour	111,086	136,090	-18.4%
4	Wemyss Bay	166,472	181,100	-8.1%
5	Riding Mill	27,986	30,320	-7.7%
6	Hyde Central	81,512	85,378	-4.5%
7	Wylam	105,572	110,279	-4.3%
8	Reddish North	174,334	181,413	-3.9%
9	Levenshulme	512,654	533,227	-3.9%
10	Marple	454,858	472,000	-3.6%

1.204 The largest impacts on the 2015/16 statistics are at Prestwick International Airport (due to the double-counted airport products not being included), Altrincham (interchange with Manchester Metrolink), and Ardrosson Harbour (due to the double-counted ferry products not being included).

Methodological Changes in 2014/15

Redistribution of demand around Southend

1.205 At some locations on the rail network, ticket prices are the same for a number of stations in close geographic proximity. An area where this is particularly noticeable is on the southern fork of the Shenfield to Southend branch line. This line links Southend Victoria to Wickford and the Great Eastern Mainline serving the following stations:

- Rayleigh;
- Hockley;
- Rochford;
- Southend Airport;
- Prittlewell; and
- Southend Victoria.

1.206 At these stations the season ticket price to London[5] is the same, therefore London season tickets are generally sold as being from Southend Victoria, regardless of the actual origin station. This means that the ticket sales data shows that there are more people travelling to/from Southend Victoria than is actually the case as there are passengers travelling from Prittlewell with Southend Victoria tickets, for example. In order to account for this, LENNON sales data was used to estimate the number of tickets with Southend Victoria as the origin, but with the issuing office at one of the branch line stations. In these cases, it was assumed that the journey was actually being made from a point on the branch line and not from Southend Victoria.

Example:

If a Southend Victoria to London season ticket was bought at Prittlewell, its journeys are assumed to be from Prittlewell to London.

A similar process was carried out for journeys from Westcliff to London, where season tickets to London are the same price as from Southend Central and Southend East.

Table 1.37 shows the season ticket journeys before and after the adjustment. Southend Victoria journeys are redistributed among Prittlewell, Rayleigh, Rochford, Hockley and Southend Airport; Southend East and Southend Central journeys are redistributed to Westcliff only.

1.207 The methodology associated with addressing this issue was updated for the 2015/16 statistics to be consistent with a revised methodology adopted for other stations following further scoping and analysis.

[5] For the purposes of the Southend Area redistribution, “London tickets” include seasons to London Terminals and London Travelcards.

Table 1.37: Reallocated Southend to London season journeys in 2014/15 under the old and new methodology

Origin Station	Destination	New Methodology Journeys (2014/15)	Old Methodology Journeys (2014/15)
Southend Victoria	London (ALL)	130,944	1,689,770
Prittlewell	London (ALL)	383,195	56,511
Rayleigh	London (ALL)	270,238	6,997
Rochford	London (ALL)	873,041	173,084
Hockley	London (ALL)	275,511	27,085
Southend Airport	London (ALL)	43,995	23,477
Southend East	London (ALL)	372,199	446,698
Southend Central	London (ALL)	152,261	227,223
Westcliff	London (ALL)	274,576	125,115

Pay As You Go (PAYG)

1.208 In January 2014 a change was made to the way PAYG journeys were recorded in LENNON with non-National Rail origins and destinations recorded as well as National Rail origins and destinations.

1.209 The underlying methodology used to construct the MOIRA2 demand matrix had not been updated to reflect this with the result that PAYG journeys starting or ending at a non-National Rail station were allocated by default to London BR as their origin or destination in the MOIRA2 demand matrix rather than the station at which they joined the National Rail network. For example, a PAYG journey between Canary Wharf and Clapham Junction prior to January 2014 would most likely have been recorded in LENNON as being a journey from Canada Water to Clapham Junction whereas post January 2014 it would be recorded as Canary Wharf to Clapham Junction with the result that in the MOIRA2 demand matrix is recorded as being a London BR to Clapham Junction journey.

1.210 In the 2014/15 statistics an adjustment process was included to account for the change in LENNON treatment of PAYG journeys to make the statistics more consistent with previous years. This reduced the number of entries and exits associated with London Terminals and increases entries and exits at key interchange stations. It, however, remains the case that this change in LENNON affected the last quarter of the 2013/14 statistics and therefore for some interchange stations there is a substantial increase between 2013/14 and 2014/15. The

stations where this change resulted in an increase greater than 10% in 2014/15 are set out in Table 1.38.

Table 1.38: Percentage change in Entries and Exits due to PAYG adjustment

NLC	Station	Percentage change in Entries & Exits due to PAYG adjustment
1659	Canada Water	1091%
7474	West Ham	184%
4935	Whitechapel	175%
598	Harrow-On-The-Hill	121%
8875	West Brompton	117%
7400	Blackhorse Road	109%
1082	Shadwell	53%
6931	Seven Sisters	48%
6009	Highbury & Islington	41%
1457	Willesden Junction	36%
6969	Stratford	32%
3136	Greenford	30%
1553	Kentish Town	30%
3190	Ealing Broadway	27%
1419	Queen's Park (Gt London)	24%
7492	Barking	24%
1421	West Hampstead	19%
9587	Shepherds Bush	19%
5399	Balham	17%
5081	Brixton	15%
7491	Limehouse	14%
5597	Vauxhall	12%
6953	Walthamstow Central	12%
5146	Greenwich	12%
5301	Clapham High Street	11%
5578	Wimbledon	11%
5152	Woolwich Arsenal	10%
5148	London Bridge	-10%
6965	Liverpool Street	-10%

NLC	Station	Percentage change in Entries & Exits due to PAYG adjustment
7490	Fenchurch Street	-19%
577	Farringdon	-22%
6005	Moorgate	-28%
3092	Kensington Olympia	-33%

1.211 For the 2015/16 dataset it has not been necessary to include this adjustment as the MOIRA2.2 matrix has been updated to address this issue.

London Bridge Adjustment

1.212 Engineering work as part of the Thameslink Programme resulted in changes in service patterns to London Bridge in 2014/15. As many tickets 'to London' do not distinguish between specific terminals, the existing methodology for the production of the Station Usage statistics has been to use the proportions implied by the London Area Travel Survey (LATS) to split total journeys between specific terminals. As the LATS data does not account for the ongoing engineering work at London Bridge, an alternative approach was required to enable an adjustment in station entries and exits arising due to changes in journey patterns as a result of the London Bridge works.

1.213 Transport for London's Oyster Clicks Model (OCM) contains historical data of journeys made using Oyster cards, as well as estimates for paper tickets. This data was used to estimate the number of journeys 'to London Bridge' and the number of journeys 'to London Terminals' as a whole in the following process:

1. A list of stations which have journeys to or from London Bridge was created;
2. The OCM data was used to estimate the proportions of journeys that were made to and from London Bridge following the engineering work;
3. The proportions of London Bridge journeys implied by the OCM superseded the proportions implied by LATS; and
4. The residual splits to and from other London Terminals were scaled up or down to account for changes in London Bridge proportions, but held in the same proportion to each other as implied by the LATS data.

Example:

For a given station (Station A), the LATS implies that 25% of Journeys go to London Bridge, 50% to Waterloo East and 25% to Charing Cross. The OCM implies that the new proportion to London Bridge should be 10%. 10% of journeys are therefore assigned to London Bridge, leaving 90% of journeys unassigned. Previously, Waterloo East was assigned 2/3 of non-London Bridge journeys while Charing Cross was assigned 1/3. The remaining 90% is therefore split between Waterloo East and Charing Cross in this proportion.

Digby & Sowton Adjustment

1.214 Count data provided by the Avocet Line Rail User Group (ALRUG) suggested that the previous Station Usage estimates at Digby & Sowton were higher than expected. Additional data from

First Great Western suggested that a season ticket product for students are likely a part of the cause of this discrepancy. This is due to a large number of journeys being made to Exeter Central and Exeter St David's on tickets with a recorded destination of Digby & Sowton. These season journeys were redistributed to Exeter Central and Exeter St Davids from Digby & Sowton. Journeys were allocated to Exeter Central and Exeter St David's according to the proportion of season ticket journeys in the MOIRA2 matrix. The journey adjustment made at these stations is shown in Table 1.39.

Table 1.39: Digby & Sowton Journey Adjustment (2014/15)

Station	Journeys before adjustment (2014/15)	Journeys after adjustment (2014/15)	Percentage change
Digby & Sowton	894,020	571,510	-36%
Exeter Central	2,105,408	2,343,636	11%
Exeter St David's	2,424,954	2,509,220	3%

Count-based redistribution of demand at Group Stations

1.215 For tickets where the destination is a station group (such as 'Bedford Stations'), demand was allocated to individual stations based on the methodology described in the accompanying station usage main report.

1.216 In Spring 2015, passenger counts were conducted at a number of group stations. For 10 Station Groups (21 stations in total), the proportions of demand implied by the station counts were adopted to allocate demand between individual stations in the group. This adjustment only affects the split of total group station demand and not the absolute level of journeys to/from that station group. Where applicable, this updates the existing methodology described previously. Table 1.40 shows the 2013/14 and 2014/15 demand allocations for the stations in question.

Table 1.40: Changes arising to station group proportions from Spring 2015 station counts

Name	Station Group	2013/14 demand allocation	2014/15 demand allocation (including changes from Spring 2015 counts)
Bedford	Bedford BR	95.5%	95.5%
Bedford St Johns	Bedford BR	4.5%	4.5%
Canterbury East	Canterbury BR	29.8%	30.1%
Canterbury West	Canterbury BR	70.2%	69.9%
Dorking (Deepdene)	Dorking BR	26.1%	24.7%
Dorking (Main)	Dorking BR	70.7%	71.9%
Dorking West	Dorking BR	3.2%	3.5%
Edenbridge (Kent)	Edenbridge BR	32.1%	48.8%
Edenbridge Town	Edenbridge BR	67.9%	51.2%
Falkirk Grahamston	Falkirk BR	34.1%	44.2%

Name	Station Group	2013/14 demand allocation	2014/15 demand allocation (including changes from Spring 2015 counts)
Falkirk High	Falkirk BR	65.9%	55.8%
Helensburgh Central	Helensburgh BR	98.6%	98.2%
Helensburgh Upper	Helensburgh BR	1.4%	1.8%
Newark Castle	Newark BR	16.8%	35.3%
Newark North Gate	Newark BR	83.2%	64.7%
Portsmouth Harbour	Portsmouth BR	52.8%	50.6%
Portsmouth & Southsea	Portsmouth BR	47.2%	49.4%
Southend Central	Southend BR	25.8%	49.1%
Southend East	Southend BR	25.1%	28.0%
Southend Victoria	Southend BR	49.1%	22.9%
Wakefield Kirkgate	Wakefield BR	17.7%	17.5%
Wakefield Westgate	Wakefield BR	82.3%	82.5%
Worcester Foregate Street	Worcester BR	65.4%	78.8%
Worcester Shrub Hill	Worcester BR	34.6%	21.2%

1.217 Note that these counts-based splits are only applied to the Station Usage dataset, not the ODM.

Methodological Changes in 2013/14

Improved South Yorkshire PTE Infill

1.218 Building on the inclusion in the 2012/13 dataset of an improved infill for the West Yorkshire (WYPTE) and Greater Manchester (GMPTE/TfGM) PTE areas, an improved infill for the South Yorkshire (SYPTE) PTE area was included in the 2013/14 dataset. This was produced using a process derived to construct infill demand for the Rail in the North (RiN) demand and revenue model produced by Mott MacDonald and MVA for the RiN consortium and was supplied by Mott MacDonald. This is consistent with the methodology underlying the improved West Yorkshire (WYPTE) and Greater Manchester (GMPTE/TfGM) infills. At the total PTE level the impact of the new infill was to reduce demand by 1.3m. However, there was also a significant distributional impact as can be seen in Table 1.41, which shows the top ten largest changes as a result of the new South Yorkshire infill.

Table 1.41: Top Ten Changes (in absolute terms) in Entries and Exits with Inclusion of new SYPTE PTE Infill (2013/14)[6]

Station	Change in entries and exits with new infill	% Change
Doncaster	-497,139	-13%
Sheffield	-256,998	-3%
Barnsley	-150,784	-10%
Mexborough	-104,966	-34%
Rotherham Central	-69,654	-9%
Adwick	-57,110	-24%
Wombwell	49,918	30%
Bentley (South Yorkshire)	-47,014	-28%
Kirk Sandall	-45,582	-32%
Swinton (South Yorks)	-45,086	-11%

Improved Merseyside PTE Infill

1.219 Prior to 2013/14 the infill for the Merseyside area was derived from the generic PTE infill produced as part of the MOIRA2 Replacement project which was based on a 2008/09 base year. To produce updated estimates in succeeding years, the distribution of demand in the infill matrix was maintained and the total volume of demand grown, initially by the journey growth shown by the Regional Sector in the ORR's rail usage data and, since 2011/12, by the growth in journeys (from LENNON) on service codes associated with the Merseyside area.

1.220 Since 2008/09 there have been a number of developments which mean that the 2008/09 distribution is inappropriate. Of particular importance has been a movement away from RSP products to PTE products on some routes on the edges of the Merseytravel area (e.g Town Green, Aughton Park and Ormskirk on the Northern line) which means that the existing distribution underestimates demand in these areas.

1.221 Recognising the deficiencies of the existing infill, a new infill was produced by Mott MacDonald building on the PTE infill in the Liverpool City Region Model (LCRM) produced for Merseytravel. Unlike the other PTE infills, journeys in the Merseyside infill have been scaled to count data at an aggregate level across all affected stations where complete counts are available to ensure a robust match with 'reality'. This is possible since count data in the Merseyside area is more extensive and comprehensive across stations than in other areas.

1.222 The inclusion of the new infill increased entries and exits by 10.8m (5.1% of total North West entries and exits). Table 1.42 shows the top ten changes in entries and exits by station. Some

[6] As all the new Mott MacDonald infills were incorporated into the ODM at the same time, it is not possible to definitively isolate each infill. For the purposes of this exercise, stations within the Yorkshire and Humber Government Office Region were considered to be those affected by the new SYPTE infill.

of the largest changes are outside the Merseytravel area (e.g. Chester) and this is because some Merseytravel products can be used outside the core Merseytravel area.

Table 1.42: Top Ten Changes (in absolute terms) in Entries and Exits with inclusion of new Merseyside PTE Infill (2013/14)[7]

Station	Change in entries and exits with new infill	% Change
Southport	1,452,670	57%
Ormskirk	1,302,182	172%
Chester	1,204,048	39%
Liverpool South Parkway	1,025,900	135%
Waterloo (Merseyside)	1,005,970	214%
Liverpool Central	898,367	7%
Liverpool Lime Street	874,711	7%
West Kirby	851,062	314%
Sandhills	768,598	160%
Kirkby (Merseyside)	553,690	31%

Improved Strathclyde Passenger Transport (SPT) infill

1.223 A more sophisticated infill was developed by Mott MacDonald to capture demand in the Strathclyde area on a number of SPT products, namely:

- Zonecard;
- Roundabout; and
- Daytripper

1.224 Total sales data for these tickets was obtained from a combination of LENNON data and off rail sales figures from SPT. The number of journeys on each ticket type was established by applying appropriate tip rate proxies for each type. The data was distributed using Zonecard forum travel diary data and LENNON station-station reduced ticket proportions to produce an estimate of station-to-station movements. The new infill resulted in a drop in entries and exits of approximately 4.4m (2.5% of total Scotland entries and exits). The top ten changes by station are shown in Table 1.43.

[7] As all the new Mott MacDonald infills were incorporated into the ODM at the same time, it is not possible to definitively isolate each infill. For the purposes of this exercise, stations within the North West Government Office Region were considered to be those affected by the new Merseyside infill.

Table 1.43: Top Ten Changes (in absolute terms) in Entries and Exits with inclusion of new Strathclyde Infill (2013/14)[8]

Station	Change in entries and exits with new infill	% Change
Glasgow Central	-1,254,874	-4%
Glasgow Queen Street	-1,025,052	-6%
Helensburgh Central	-391,278	-32%
Motherwell	-232,668	-17%
Charing Cross (Glasgow)	-154,791	-8%
Kilwinning	-138,187	-13%
Paisley Gilmour Street	131,984	3%
Johnstone (Renfrewshire)	-129,954	-10%
Ayr	-124,246	-8%
Airdrie	-110,906	-9%

Other methodological variations

1.225 As for 2011/12 and 2012/13 the generic methodology for separating out group stations was not followed for Manchester BR, Wigan BR and Warrington BR. For Warrington BR and Wigan BR we maintained the same split of journeys between the respective stations as seen in 2010/11 at a flow and route code level. For Manchester BR the split was maintained at the station level.

Methodological Changes in 2012/13

Improved Greater Manchester and West Yorkshire PTE Infill

1.226 Building on the inclusion in the 2011/12 dataset of an improved infill for the Centro area, an improved PTE infill was included in the 2012/13 dataset for two of the remaining PTEs – West Yorkshire (WYPTE) and Greater Manchester (GMPTE/TFGM). This was produced using a process derived to construct infill demand for the Rail in the North demand and revenue model produced by Mott MacDonald and MVA for the Rail in the North (RiN) consortium and was supplied by Mott MacDonald.

1.227 The impact of the methodological change at the PTE level is shown in Table 1.44.

Table 1.44: West Yorkshire and Greater Manchester PTE Infill (2012/13) journeys

PTE	Old Methodology	New Methodology
West Yorkshire PTE	6.83	8.67

[8] As all the new Mott MacDonald infills were incorporated into the ODM at the same time, it is not possible to definitively isolate each infill. For the purposes of this exercise, stations within the Glasgow Government Office Region were considered to be those affected by the new SPT infill.

Greater Manchester PTE	5.05	5.10

Source: Steer Analysis of PTE infill based on a station classification into PTEs – this necessitates a simplified treatment of cross-PTE boundary flows

1.228 The new infill had a significant impact at the total level for the West Yorkshire PTE area with a 27% increase in the number of journeys on West Yorkshire PTE tickets. The impact on the total size of the GMPTE infill was much smaller but there were still significant distributional impacts as demonstrated by the presence of a number of GMPTE stations in the top ten changes from the improved infill as shown in Table 1.45.

Table 1.45: Top Ten Changes (in absolute terms) in Entries and Exits with Inclusion of New PTE Infill for GMPTE and WYPTE (2012/13)

Station	Entries and Exits (with old infill)	Entries and Exits (with new infill)	Change in Entries and Exits (%)
Leeds	24,450,682	26,200,916	7%
Huddersfield	4,022,672	4,656,700	16%
Manchester Airport	3,414,466	3,136,816	-8%
Bolton	3,313,742	3,583,392	8%
Bradford Interchange	2,782,466	3,004,718	8%
Dewsbury	1,389,050	1,603,702	15%
Manchester Piccadilly	23,358,295	23,158,477	-1%
Guiseley	945,722	1,134,560	20%
Shipley (Yorks)	1,497,954	1,666,542	11%
Castleford	413,318	537,898	30%

Calibration of entries and exits to count data at group stations

1.229 The key addition to the underlying MOIRA2 data in the construction of the Station Usage dataset is the breakdown of group station flows into their component stations. This is a significant task and the existing methodology based primarily on sales data is becoming less robust as increasing volumes of sales are completed via the internet.

1.230 For the purposes of the 2012/13 dataset we therefore undertook a significant programme of counts at a number of stations to provide a basis for allocating demand at the station group level between these stations.

1.231 In the application of the count data, consistency with the underlying ODM data was maintained by controlling total entries and exits at the station group level to the total station group demand in the underlying matrix. Count data was then used to apportion the total station group demand between the individual stations. It is important to emphasise this point – the count data was only used to distribute demand between stations within each of the relevant station groups. It was not used to set the overall level of demand. Use of count data to set the total level of entries and exits by station was not implemented for a number of reasons, including:

- Consistency with underlying data in the ODM matrix;

- Seasonal variation in demand would need to be accounted for on a robust basis; and
- Counts would need to be undertaken in succeeding years and on a sufficiently robust basis to ensure random variation between years was minimal.

1.232 Following the counts a thorough process of validation was completed, utilising, where possible, information and data provided by Train Operators to corroborate the count data. On completion of the validation it was agreed with the ORR that the outputs of the count data would be used to allocate demand between stations for the stations listed in Table 1.46. This table also shows the distribution of entries and exits between the stations with the previous and new methodology. The dominant trend in the changes is an increase in demand at the smaller (and often ticket office-less) stations at the expense of the larger stations in the group.

Table 1.46: Stations Impacted by use of Count Data to Distribute Demand Between Group Stations (2012/13)

Group	Station	Previous methodology	New methodology	Change (%)
Farnborough BR	Farnborough (Main)	3,149,316	2,859,700	-9%
Farnborough BR	Farnborough North	328,684	618,300	88%
Bedford BR	Bedford	3,448,926	3,303,270	-4%
Bedford BR	Bedford St Johns	9,320	154,976	1563%
Wakefield BR	Wakefield Westgate	2,240,342	2,266,915	1%
Wakefield BR	Wakefield Kirkgate	514,862	488,289	-5%
Maidstone BR	Maidstone East	1,796,012	1,343,900	-25%
Maidstone BR	Maidstone West	529,796	834,293	57%
Maidstone BR	Maidstone Barracks	120,150	267,765	123%
Dorking BR	Dorking (Deepdene)	389,786	454,909	17%
Dorking BR	Dorking (Main)	1,354,864	1,234,007	-9%
Dorking BR	Dorking West	40	55,774	139435%
Newark BR	Newark North Gate	1,096,442	1,179,491	8%
Newark BR	Newark Castle	320,558	237,509	-26%
Dorchester BR	Dorchester South	533,304	469,294	-12%
Dorchester BR	Dorchester West	66,828	130,838	96%
Colchester BR	Colchester	4,574,692	4,291,055	-6%
Colchester BR	Colchester Town	459,380	743,017	62%
Portsmouth BR	Portsmouth & Southsea	2,352,460	1,965,324	-16%

Portsmouth BR	Portsmouth Harbour	1,809,936	2,197,072	21%
Hertford BR	Hertford North	1,342,800	1,338,227	0%
Hertford BR	Hertford East	769,974	774,547	1%

1.233 Note that these counts-based splits are only applied to the Station Usage dataset, not the ODM.

Methodological Changes in 2011/12

Improved PTE Infill growth rate

1.234 With the initial version of MOIRA2 an improved representation of PTE demand was included in the base demand matrix based on work undertaken by Steer for the year 2008/09. This included journeys from tickets sold at non-railway sales points and an estimated distribution of journeys largely based on the distribution of point to point tickets sold in PTE areas.

1.235 Subsequent versions of the MOIRA2 demand matrix have included a PTE infill but the journeys are now based directly on LENNON data and are therefore not consistent with the 2008/09 infill.

1.236 To maintain consistency with previous ORR statistics the PTE infill contained in the ODM was therefore based on the 2008/09 MOIRA2 PTE infill grown by growth rates derived from National Rail Trends data.

1.237 Up until 2010/11 the application of growth was carried out at a highly aggregate level based on growth seen for 'franchised regional operators' as reported in National Rail Trends data. In the construction of the 2011/12 dataset a more disaggregate set of growth rates were applied at the PTE level based on LENNON data to improve the appropriateness of the growth rates applied and reflect geographical variations in demand growth.

Inclusion of revised West Midlands PTE (Centro) Infill

1.238 Steer were commissioned in 2011 by the Passenger Demand Forecasting Council (PDFC) to construct a PTE infill matrix for the Centro area for the rail year 2010/11. The methodology followed that used for the construction of the original MOIRA2 infill but included use of additional data sources and specific adjustments for known issues such as directionality.

1.239 This infill represented a significant improvement on the infill in the ODM and therefore as part of the 2011/12 update the PDFC infill was updated to 2011/12 data and included in the ODM and hence the Station Usage dataset.

1.240 The inclusion of the Centro infill represented a significant change for stations within the Centro area and also a number of stations not in the Centro area but where Centro tickets can be purchased for travel into the Centro area. For the majority of stations the inclusion of the infill resulted in an increase in entries and exits although in a small number of instances there was a decrease. A comparison of the 2011/12 Centro infill with the 2010/11 ODM infill is included in Table 1.47. This shows that the new infill added approximately 5 million journeys (10 million entries and exits) compared to what would have been derived had the previous methodology been used.

Table 1.47: Centro area infill comparison

	2010/11 ODM infill	2010/11 infill grown to 2011/12 using previous methodology	2011/12 updated infill
Journeys (m)	15.5	16.6	21.3

New 'Other' infill layer

1.241 In some non-PTE areas there are zonal products which are not captured within the MOIRA2 demand matrix (e.g. Rover and Ranger products). Whilst volumes of travel on these tickets are relatively small, in the area of use they can be significant. Therefore, in the 2011/12 update we included journey estimates for a number of Rover and Ranger products. These were:

- St Ives Group Day Ranger;
- St Ives Day Ranger;
- St Ives Family Day Ranger;
- Valleys Night Rider; and
- Cambrian Coaster Ranger.

1.242 Journeys on these products were included as an 'Other' infill in the ODM, together with journeys from some non-LENNON season ticket products previously included in the airport flow infill. Journey estimates for these products were constructed using LENNON data and distributing journeys based on point of sale and the underlying reduced ticket travel distribution of the stations covered.

1.243 The total number of entries and exits arising from inclusion of these journeys was 760k. Table 1.48 lists the top five stations impacted most significantly:

Table 1.48: Top five stations impacted by inclusion of the 'Other' infill

NLC	Station Name	2010/11 entries and exits	2011/12 entries and exits	Reason
3538	St Ives (Cornwall)	258,530	578,214	Inclusion of St Ives branch line rover products
3542	Carbis Bay	55,334	206,736	
3537	St Erth	120,770	202,362	
3498	Lelant Saltings	17,224	101,284	
3899	Cardiff Central	11,259,968	11,502,080	Inclusion of Valley Night Rider product

Calibration of entries and exits to count data at group stations (pilot)

1.244 A key addition to the underlying MOIRA2 data in the construction of the Station Usage dataset is the breakdown of group station flows into their component stations. This is a significant task and based primarily on sales location data which is becoming less robust as increasing volumes of sales are completed via the internet.

1.245 For the purposes of the 2011/12 dataset a pilot was conducted for stations within the Liverpool BR group of stations, using count data to allocate journeys between the stations. The stations that this impacted were:

- Liverpool Lime Street;
- Liverpool Central;
- Liverpool James Street; and
- Moorfields.

1.246 Count data sourced from the DfT and Merseytravel enabled the calculation of the split of demand between the central Liverpool stations as shown in Table 1.49. These percentages were then used to divide total central Liverpool demand, as calculated by the Station Usage process, between the central Liverpool stations. The same splits were applied across all ticket types.

1.247 Note that this count based methodological change is only applied to the station usage dataset, not the underlying ODM.

Table 1.49: Modification of central Liverpool Station Usage data

Station	2011/12 Entries and Exits old methodology	Implied split between stations	Implied split between stations from counts	Adjusted Liverpool station entries and exits
Liverpool Lime Street	11,882,144	32%	37%	13,835,314
Liverpool Central	17,497,878	47%	38%	14,209,241
Liverpool James Street	3,524,654	9%	8%	2,991,419
Moorfields	4,488,064	12%	17%	6,356,766

Inclusion of Freedom Pass journeys in PTE Infill

1.248 The TfL concessionary product the 'Freedom Pass' is included in the Oyster system. However, unlike paid-for Oyster products, travel on the Freedom Pass was not included in the Station Usage estimates prior to 2012/13. Given the volume of rail travel on the Freedom Pass (circa 21 million entries and exits in 2012/13) inclusion of these journeys where possible in the Station Usage dataset was highly desirable.

1.249 To facilitate the inclusion of Freedom Pass journeys TfL provided the following data to enable an estimate of Freedom Pass journeys on the rail network:

- Total journeys on Freedom Pass with touch in/out at least one end of the journey at a 'NR subsystem'9 station for each period in the 2012/13 year
- Origin and destination breakdown of Freedom Pass journeys where the passenger touched in or out for period 4 of 2012/13 (July 2012), including a distinction between London Underground and National Rail services e.g. entries and exits at London Bridge National Rail and London Bridge London Underground are recorded separately

1.250 Inclusion of the Freedom Pass journeys was then achieved through a two-stage process:

- Calculation of period 4 Freedom Pass journeys on National Rail/London Overground services by assigning each origin destination in the sample period 4 data as being either a National Rail/London Overground journey or not. This was required to exclude journeys not on the National Rail/London Overground network.
- Estimation of total 2012/13 Freedom Pass journeys on National Rail/London Overground by flow by using the periodic 'NR subsystem' data to inform an expansion of the period 4 journeys.

1.251 The number of Freedom Pass journeys included was necessarily a conservative estimate since it does not capture journeys where the passenger did not have to touch in or out. In addition, the smallest flows in the period 4 dataset were not being included since it was not practical to categorise every single flow.

1.252 Table 1.50 shows the top ten increases in Station Usage from the inclusion of Freedom Pass journeys. This shows that the numbers of Freedom Pass journeys are sufficient to have a significant impact at even relatively heavily used stations such as West Croydon.

Table 1.50: Top Ten Changes (in absolute terms) in Station Usage from Inclusion of Freedom Pass Data

Station	Without Freedom Pass	With Freedom Pass	Change (%)
Victoria	75,884,234	77,346,676	1.9%
Waterloo	94,673,486	95,936,542	1.3%
London Bridge	52,342,710	53,351,116	1.9%
East Croydon	20,060,778	20,965,248	4.5%
Clapham Junction	22,916,064	23,622,718	3.1%

[9] The NR subsystem is a set of stations which is used for recording purposes by TfL. It is composed primarily of National Rail stations but does include some joint stations (e.g. Wimbledon). As such it could not be used to provide a completely clean estimate of total National Rail Freedom Pass journeys but the periodic data was informative when scaling the detailed Period 4 data to the whole year.

Station	Without Freedom Pass	With Freedom Pass	Change (%)
Liverpool Street	57,856,458	58,448,814	1.0%
Charing Cross	38,140,698	38,607,238	1.2%
Stratford	25,129,740	25,564,250	1.7%
Wimbledon	18,475,254	18,902,016	2.3%
West Croydon	3,880,666	4,300,582	10.8%

1.253 From 2015/16 Freedom Pass journeys were already included in the MOIRA2.2 dataset and therefore no further adjustments were required as part of production of Estimates of Station Usage.

Additions to the 'Other' infill layer

1.254 In 2011/12 a number of zonal products outside PTE areas and not captured within the MOIRA2 demand matrix were included for the first time in the dataset as part of a new 'Other' infill layer. In the 2012/13 dataset a further five non-PTE zonal products were included. The products included were:

- Anglia Plus;
- Devon Evening Ranger;
- Devon Day Ranger;
- Ride Cornwall; and
- Freedom Travel Pass (West of England product).

1.255 Journey estimates for these products were constructed using LENNON data and distributing journeys based on point of sale and the underlying reduced[10] ticket travel distribution of the stations covered.

1.256 The total number of entries and exits arising from inclusion of these journeys is 1.05m. Table 1.51 lists the top ten stations impacted most significantly:

Table 1.51: Top Ten Stations Impacted by Inclusion of the 'Other' Products

Station Name	Without "Other" Products	With "Other" Products	Change (%)	Reason
Norwich	3,949,610	4,126,012	4.5%	Inclusion of Anglia Plus products
Ipswich	3,202,062	3,348,394	4.6%	
Cambridge	9,080,762	9,168,936	1.0%	
Bury St Edmunds	501,966	566,110	12.8%	
Plymouth	2,530,000	2,579,316	1.9%	Inclusion of Devon/Cornwall Rangers

[10] With the exception of the Anglia Plus product which has both Reduced and Season variants. For the Season variants of this product the underlying Full ticket travel distribution of the stations covered was used given that the coverage of Season tickets in the base matrix was limited.

Station Name	Without "Other" Products	With "Other" Products	Change (%)	Reason
Lowestoft	411,536	459,166	11.6%	Inclusion of Anglia Plus products
Exeter St David's	2,361,172	2,401,276	1.7%	Inclusion of Devon Rangers
Stowmarket	897,376	927,856	3.4%	Inclusion of Anglia Plus products
Thetford	264,318	287,024	8.6%	
Bristol Temple Meads	9,076,954	9,099,332	0.2%	Inclusion of Freedom Travel Pass products

2 Methodology changes prior to 2011/12

2.1 A series of methodological improvements have been made to the Station Usage dataset since 2006/07 and the improvements made to the ODM and Station Usage methodology are described in the section. This appendix is divided into two sections:

- Methodology changes prior to 2011/12: These changes were implemented by Resonate (formerly DeltaRail) who were the consultants working for the ORR to produce the statistics prior to 2011/12.
- Methodology changes from 2011/12: These changes are those that have been specified and implemented by Steer.

It should be noted that the information in this section has been reproduced from previous reports on the Station Usage statistics produced by Resonate.

2.2 Between 2006/07 and 2008/09 the accuracy and usefulness of the ODM was improved by applying new procedures on the way journeys with unknown origin and/or destination have been treated, and by including journeys that were previously excluded from the file or did not appear in the LENNON sales data. In summary, the main changes were:

- Adding in previously missing journeys, e.g. TfL sold Travelcards, and some airport link tickets - this is undertaken in the production of the MOIRA2 demand matrix.
- Rail Links such as PlusBus and Attractions. The rail element of these ticket sales is now included - this is undertaken in the production of the MOIRA2 demand matrix.
- Estimating the split of records for station groups, including London BR, into the constituent individual stations. This methodology was further refined for those groups with no ticket office at one or more stations within the group - this processing is undertaken in the ODM,
- Via the integration with the process that creates the MOIRA2 Demand Matrix, PTE ticket sales are now included, in addition to TfL sold Travelcards, and some airport link tickets – this is undertaken in the production of the MOIRA2 demand matrix.
- The method for estimating passenger journeys from ticket sales has changed. This is a result of using the MOIRA2 Demand Matrix as a starting point. The MOIRA2 Demand Matrix does not disaggregate single journeys, and so when estimating passenger journeys all ticket sales have been split equally into the two directions of travel. This will only have an impact on the ODM if there is more travel on single tickets away from a station compared to travel to the station, which is not likely to be material. Therefore, in the Station Usage file, entries are the same as exits.

2.3 In 2009/10 further improvements were made:

- Adding in data for journeys undertaken by Oyster “pay-as-you-go” (PAYG) in the London area. This is undertaken within the base LENNON data, in the production of the MOIRA2 demand matrix. This applies to journeys made after 1 January 2010.
- Refinement of the methodology used to calculate journeys undertaken using PTE tickets.

2.4 When the 2010/11 dataset was constructed it emerged that the original 2008/09 figures which were given for one PTE, West Yorkshire, were not a complete record of all the rail journeys on multimodal tickets which should have been included in the PTE infill. A correction was therefore made by uplifting the West Yorkshire PTE Infill, both revenue and journeys figures, by 53% on top of the generic PTE infill growth rate. Note that within West Yorkshire PTE area, the majority of rail journeys are made on rail-only tickets, i.e. not PTE Infill tickets. Therefore the overall effect of this correction was relatively small.

Oyster PAYG

2.5 Oyster 'Pay As You Go' (PAYG) was rolled out at National Rail stations in January 2010. Prior to this date Oyster PAYG was available on selected routes only and was not recorded (in LENNON) on a flow or station basis. After this date Oyster PAYG was available at all National Rail stations in the Travelcard Area are recorded by flow.

2.6 The 2009/10 data contained roughly 9 months of data prior to January 2010 and 3 months of data after, while the 2010/11 data which was wholly after January 2010 when Oyster PAYG, with data capture, had been fully implemented contains a full year of data. This lead to some very large reported growth figures for some stations within the London Travelcard (/Oyster PAYG) area. The 2010/11 figures, based on recorded use of Oyster PAYG should be accurate, but the percentage growth may be over-represented since the old figures would be largely estimates made without the benefit of Oyster records.

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