DeltaRail

Station Usage 2007/08

27 February 2009

Title	Station Usage 2007/8
Customer	Office of Rail Regulation
Customer reference	Jay Lindop
Confidentiality, copyright and reproduction	
File reference	J:\Rail\Consultancy\1_Projects\15537 (ODM and Station Usage 07/08)
Report number	LD15537-RP-2
Issue number	Issue 1

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Executive Summary

This report explains the information contained within the Station Usage file. The report provides guidance to the methodology we have followed during the process of creating the final information in this file for financial year 2007/8.

Station Usage data consists of estimates of the total numbers of people

- Travelling from the station (entries)
- Travelling to the station (exits)
- Interchanging at the station (interchanges)

Information is given for all the national rail stations around England, Scotland, and Wales based on tickets sales data. These results are the most recent in a series we have supplied since 1997/98. The spreadsheet is in a similar format to those previously provided.

Several major enhancements were made to the methodology for 2006/7 compared with previous years. These have resulted in a more comprehensive and accurate dataset. The four main changes that have been made are:

1. We added additional data representing journeys made on national rail using London Travelcards that were sold at a TfL outlet, or at a TOC office in Zone 1. These data were excluded in previous years since it is not clear which journeys have been made, but this year a process has been employed to estimate the likely journeys being made.

2. We added information about Gatwick and Stansted Express tickets that are sold outside of the LENNON system.

3. We included tickets sold for national rail journeys at London stations that have only an LUL, not a TOC, booking office

4. We changed the methodology for journeys made to and from Station Groups (including London).

In addition, in 2007/8, due to previous problems, we have further enhanced the methodology for splitting trips to and from Station Groups where not all stations have ticket offices.

We have undertaken a thorough programme of checks on the Station Usage data. Results of some checks are listed in the spreadsheet, and further details are given in Appendix 1.

Users of Station Usage information should take note of the limitations of this dataset, outlined in Chapters 5 and 9.

Contents

1 Introduction

DeltaRail has provided a series of Station Usage data for the rail industry in previous years. This report accompanies the Station Usage data for 2007/8, provided in the spreadsheet "Station Usage 2007-08.xls". It gives details of the process and outputs in producing the Station Usage file for financial year 2007/8, on behalf of the ORR. The journey data has been taken from the ticket sales recorded in the LENNON database.

DeltaRail are providing the ORR with an MS Excel file containing entries, exits and interchanges made at stations throughout England, Scotland and Wales, for the financial year 1 April 2007 to 31 March 2008. For the entries and exits, figures are split into the three main categories of the available ticket products (Full, Reduced, and Season). For the interchanges only totals are available.

2 Base LENNON Data

DeltaRail received comprehensive LENNON sales data from ATOS Origin based on the financial year 1st April 2007 until 31st March 2008. The fields in the base data are shown below:

- Product Code
- Product Description
- Origin NLC
- Destination NLC
- Route Code
- Day of Week
- Issues
- Revenue
- Journeys

3 Summary of Results

Compared with the initial LENNON dataset received, around 8% of the total journeys are excluded from the final Station Usage Matrix delivered for 2007/8. Details of which records have been excluded are shown in Section 5. The following table gives the total number of entries, exits, and interchanges made over the whole network for 2007/8, compared with the two previous years.

Table 3-1: Entries, Exits and Interchanges for 2005/6 to 2007/8 (millions)

Year	Entries	Exits	Entries & Exits	Interchanges
2005/6	800.46	800.63	1,601.09	120.02
2006/7	958.10	958.76	1,916.85	133.19
2007/8	1,034.11	1,034.74	2,068.85	141.00

Overall, the increase in entries and exits is around 8% in 2007/8, compared with the previous year. Most of this represents an actual increase in rail journeys, though a small portion is due to new types of journeys added this year (see Section 6.1). Note that much of the increase between 2005/6 and 2006/7 was accounted for by improvements in the process, taking in more London Travelcard journeys.

3.1 Overview of the Entries and Exits Results

In this section we set out a summary of the overall entries and exits results. The spreadsheet contains entries and exits results for 2,519 stations, compared with 2,519 last year. The tables below show the 9 stations deleted, and the same number of new stations added.

Table 3-2 – Stations deleted in 2007/8

NLC	Name
1279	Barlaston
6963	Canning Town
6964	Custom House
6929	North Woolwich
1356	Norton Bridge
2228	Garston (Merseyside)
6932	Silvertown
1316	Stone(1)
1357	Wedgwood

Note (1): A temporary closure – the station reopened recently

Table 3-3 – Stations added in 2007/8

NLC	Name
9882	Coleshill Parkway
9902	Crosskeys
9915	Ebbw Vale Parkway
9925	Llanharan
9916	Llanhilleth
9919	Newbridge
9920	Risca & Pontymister
9921	Rogerstone
9587	Shepherds Bush

The table below shows data for the 10 stations with the highest numbers of entries and exits for 2007/8.

Table 3-4: Top 10 stations based on the entries and exits made for 2007/8.

Station	Entries & Exits (2007/8)	Change	Rank Last year
London Waterloo	100,306,690	19%	1
London Victoria	77,462,118	16%	2
London Liverpool Street	57,789,977	5%	3
London Bridge	54,124,745	14%	4
London Charing Cross	39,063,680	12%	5
London Euston	29,341,183	15%	7
London Paddington	29,224,721	7%	6
London Kings Cross	24,629,269	9%	7
East Croydon	22,583,906	16%	-
London Cannon Street	22,177,066	5%	9

Nine of the top ten stations have remained the same as last year and nine of the ten are London Terminals. East Croydon has replaced Glasgow Central in the list because the flows increased by 16%, compared with Glasgow's 3%.

The total journeys made at one of the top ten stations account for a total of 457 million, 13% more than the 406m journeys made last year. The top ten stations account for 22% of all entries and exits, compared with 21% in 2006/7.

We need to mention that for stations like Glasgow Central and Manchester Piccadilly, and indeed all Passenger Transport Executive (PTE) areas, the usage figures are underestimated because of the missing data from PTE sold tickets (see Section 9.2).

3.2 Overview of the Interchanges Results

In all, around 141 million interchanges are estimated to have been made among National Rail operated services (interchanges between rail and tube or other modes is excluded). This is an increase of about 6% compared to the 2006/7 results (133 million). The ten top stations are listed in the table below.

Table 3-6: Top 10 stations based on the interchanges made for 2007/8.

Station Name	Total Interchanges		Change
	2007/8	2006/7	(%)
Clapham Junction London	16,513,166	12,898,160	28%
London Bridge	7,229,819	7,768,209	-7%
East Croydon	5,901,974	5,122,701	15%
Waterloo London	4,810,307	4,226,542	14%
Victoria London	3,411,911	3,293,684	4%
Birmingham New Street	3,388,807	3,794,980	-11%
Kings Cross (London)	2,694,392	2,100,857	28%
Lewisham	2,653,293	1,054,532	152%
Reading	2,499,613	2,688,110	-7%
Finsbury Park London	2,437,577	1,033,482	136%

Interchanges occurred at 511 stations in 2007/8, similar to the 510 stations in 2006/7. Stations appearing for the first time in 2007/8 and those not seen this time are listed below. The two main changes are Liverpool South Parkway, which is a comparatively new station, and Kings Cross Thameslink which has ceased to exist.

Table 3-7: Changes in Interchange Stations in 2007/8.

Stations:	Total Interchanges	
	2007/8	2006/7
New:		
Liverpool South Parkway	253,034	
Penrith	15,704	
New Cross	10,410	
New Cross Gate London	10,297	
Old:		
Kings Cross Thameslink		707,674

We have not identified reasons for changes in the interchanging stations. However, it is important to note that interchanges can change significantly from year to year for a variety of reasons. Factors such as new service patterns and changes in journey times play a part. The number of interchanges is based on the rail industry ORCATS model, which predicts passenger choices of rail route and trains used. Please refer to Appendix 2 for more information on the ORCATS allocation process.

4 Station Usage File Definition

This spreadsheet lists the entries, exits and interchanges made at stations throughout England, Scotland and Wales in the financial year 2007/8 (1st April 2007 to 31st March 2008). It also gives details about the entries and exits for different ticket categories. It contains data on entries and exits made at rail stations by passengers using the rail network.

The fields included in the Station Usage file are:

Table 4-1: Station Usage File

Field	Description
Station (Name, NLC, TLC)	Station Name, NLC: National Location Code, TLC: Three Letter Code
District, County and Region for the Station.	Station's geographical location.
Station Facility Owner (SFO)	The company that is the station facility owner (provided by Network Rail).
Group of Stations	Name of the Group where applicable
Entries (Full, Reduced, Season, Total)	Entries made at the stations split by ticket categories and in total
Exits (Full, Reduced, Season, Total)	Exits made at the stations split by ticket categories and in total
07/08 Entries & Exits	Sum of Entries and Exits for 2007/8
07/08 Entries & Exits Total	Sum of Entries and Exits for 2007/8
07/08 Interchanges	Total Interchanges made for 2007/8
Change	Compare 2007/8 Entries & Exits against 2006/7
Check 1	Fail when either entries or exits individually constituted less than 40% of total entries and exits
Check 1 Reason	Identified reason(s) for failing the check
Check 2	Fail if number of entries & exits combined is more than 20% higher or lower than figure in 2006/7
Check 2 Reason	Identified reason(s) for failing the check

5 Data Excluded From the Study

Some of the LENNON data was excluded from the analysis, and subsequently from the Station Usage data.

All the products that were classified as miscellaneous tickets were excluded. These products were:

- Rover Tickets
- BritRail Tickets
- Car Parking,
- Railcards Sales,
- Penalty/Excess Fares,
- Seat Reservations,
- Sleeper Supplements.

Also from the analysis were excluded all the flows that had either Origin or Destination an "I code", usually some form of special pass that cannot be identified with a station, e.g.

- Freedom Passes
- West Midlands Zones
- Merseyrail Zones
- Centrocard
- Gate passes usually used by staff
- Passenger Charter Discounts
- Headquarters Items

Finally flows that have either Origin or Destination a Private Settlement Code were excluded from the analysis, e.g.

- PTE tickets
    - WYPTE Metrocard
    - GMPTE Traincard
    - Anglia Plus

- Irish Stations (Codes M and N)
    - Dublin
    - Belfast
    - Dun Laoghaire

In total the data we have excluded from the analysis account for around 8% of the total journeys.

6 Entries and Exits Methodology

We calculated an estimate of the number of people entering and exiting each of the National Rail stations for the financial year 2007/8. The entries and exits at each station were derived from the journey data recorded in the LENNON database.

Each year DeltaRail receives a file from Atos Origin containing the revenue, number of journeys and ticket issues for each flow on the network, for each product. These revenue and journey figures are unallocated, in other words are based on the actual ticket sales before the allocation to the different Train Operating Companies.

After completing checks on the data, the data was transformed into an origin/destination file, where each record reflected an estimate of the actual journeys undertaken. The file contained the number of journeys for each flow, where a flow consisted of a unique origin, destination and route code combination.

The number of entries and exits was calculated for a particular station by summing all journeys starting at the station, and all journeys terminating at the station.

6.1 Journeys added in this year

This year we added Rail Links tickets. These are those sold to an attraction or which include a bus link. For instance 'Bluewater Through Ticketing' (NLC G223) is converted to Greenhithe (NLC 5138). This change increases the overall proportion of tickets that are now coded to the appropriate rail journey.

6.2 Unknown Destinations

Ticket sales do not always tell us where a passenger is travelling. Ticket sales can be divided into the seven categories listed in table below. As in previous years, we have converted the ticket sales data from LENNON into an estimate of the actual stations that passengers are travelling to.

Table 6-1: Categorisation of Ticket Sales in LENNON

Flow Category	Description
Category 1	Origin and Destination Stations Known
Category 2	Origin or Destination a Group Station (excl. London Terminals)
Category 3	Origin or Destination is London Terminals
Category 4	Origin or Destination a London Travelcard including Zone 1
Category 5	Origin or Destination a London Travelcard excluding Zone 1
Category 6	Origin or Destination a London Travelcard Boundary Zone
Category 7	Non-National Rail Stations

Category 1 – Origin and Destination Stations Known

Both the origin and destination were known stations so no further work was needed for such flows.

Category 2a – Origin or Destination a Group with all Stations Having a Ticket Office

In 2005/6 all origins or destinations that were a group station (with the exception of London BR) were changed to the major station within the group. For example, all ticket sales to or from Reading BR are recoded to Reading. This was clearly over-simplistic.

In 2006/7 the O-D matrix was based on the journeys from ticket sales to the individual stations within a group. We assumed that passengers travelling **to** the stations in a group would act in the same way as passengers travelling **from** the stations in that group. We believed that this was, in general, a valid assumption to make, and no bias would be introduced into the journey figures.

In 2007/8 this process is still used where all stations in the group have ticket offices, so that the relative flows from the individual stations are sufficient to predict the pattern of travel.

For example, in 2006/07 the journeys between stations in the 'Manchester BR' group and Crewe and vice-versa were shown by the column "jnys" in the table below. First the proportion of journeys **from** each of the individual Manchester stations **to** Crewe is determined, as shown in column "%split".

Then these proportions are applied to both the 'Manchester BR to Crewe' and 'Crewe to Manchester BR' flows, giving the breakdowns to individual stations shown in column 'BR portion'. These are added to the base values to give "Total Journeys", before the 'Manchester BR to Crewe' and 'Crewe to Manchester BR' flows are deleted, to avoid double counting. The slight discrepancy between the Grand Totals is due to rounding error.

Table 6-1: Example of how we split journeys to/from a BR group of stations

Orig	Dest	Origin Name	Destination Name	Jnys	%split	BR portion	Total Jnys
2963	1243	DEANSGATE	CREWE	83	**0.32%**	85	168
2966	1243	MANCH OXF RD	CREWE	5,464	**21.03%**	5580	11,044
2968	1243	MANCH PICC	CREWE	19,733	**75.95%**	20152	39,885
2970	1243	MANCH VICT	CREWE	700	**2.69%**	714	1,414
0438	1243	MANCH BR	CREWE	26,533		**Remove**	
1243	2963	CREWE	DEANSGATE	207		1478	1,685
1243	2966	CREWE	MANCH OXF RD	2,262		97287	99,549
1243	2968	CREWE	MANCH PICC	8,017		351349	359,366
1243	2970	CREWE	MANCH VICT	343		12464	12,807
1243	0438	CREWE	MANCH BR	462,578		**Remove**	
			Grand Total:	525,920			525,918

The above methodology has been applied to all flows with more than 1,000 journeys in total leaving the individual group stations (i.e. not including the 'BR Group NLC to

destination' flow. For the smaller flows an average split is applied based on the flows with more than 1,000 journeys.

Category 2a – Origin or Destination a Group with some Stations Having no Ticket Office

For this class of stations the above process breaks down because the proportion of journeys **to** the group stations with no ticket offices will tend to be estimated as zero because the sales **from** those stations are necessarily zero. For these groups an alternative process is used which considers each origin station / group destination pair in turn and estimates the proportion of flow to each group station from the origin according to the existence or relative attractiveness of the service to each of the group stations.

For some stations in a group this is not possible. If the two group stations are adjacent on the same line it is not possible to determine the split of passengers between them on the basis of train service data only – in this case judgment has to be used.

Category 3 – Origin or Destination was London BR

This category contained all flows that had London BR as either the origin or destination. In order to assign an appropriate London station on flows where either the origin or destination is London BR (NLC=1072), we analysed responses from the 2001 LATS survey. For journeys from any given station, we found out what percentage of passengers use each London terminus.

For example, if the flow was from Ashford International to London BR, we used our pre generated table showing the percentage spilt between the alternative London termini for passengers starting at Ashford International. From this we apportioned the exits between London Bridge, Charing Cross, Victoria and other London termini.

Stations with small sample sizes were removed from the 2001 LATS data. Where there was insufficient data in the 2001 LATS to generate the split for a particular station, a similar process with the Non London Groups methodology was applied. Firstly for all the flows with more than 1000 journeys leaving London BR and having as a destination the particular station we used split factors as above. However, if the sum of journeys was less than 1000 we assigned to the flow the top origin from the London BR stations. This is different to the methodology applied the previous years, where the TOC operator at the station was the factor used to determine which London terminal the passenger start or end their journey.

Category 4 – Origin or Destination a London Travelcard including Zone 1

All origins and destinations that were London Travelcard Zones that include Zone 1 were converted to 'London BR' under the assumption that they will travel to the same stations as point-to-point passengers and then transfer to another mode. The methodology set out above for Category 3 was then applied.

Before applying the above methodology, we also used MOIRA[1] assumptions for the joint stations with only a TOC issuing office, in order to split the flows into a rail and a LUL

[1] MOIRA: A model, supported by DeltaRail, to forecast revenue changes due to timetable changes.

portion. This part was necessary since for these stations, LENNON shows all the sales, while only a proportion of those passengers will be travelling with National Rail.

So if a flow was showing Finsbury Park to Z1234, then we firstly split the journeys, based on MOIRA assumption into Rail and LUL portion. Then we continued for the rail part of the flows applying the above methodology, as detailed for category 3. The LUL portions of these flows have been left out of the Station Usage figures.

Category 5 – Origin or Destination a London Travelcard excluding Zone 1

This category contained all Travelcards that did not include Zone 1, for example Zone R2345 London.

For flows with origin or destination a London Travelcard (excluding zone 1) we use a set of assumptions used in MOIRA to convert the Travelcard into a destination station. These assumptions have been created using survey responses from the 2001 LATS. They use the starting station to work out which stations it is possible for the passenger to be travelling to, and also give the proportion of passengers travelling to each of these stations. This is based on the assumption that a passenger holding a Zones 2-6 Travelcard would travel as far as Zone 2. Also for this category when the origin was a joint station with only a TOC issuing office we firstly split the journeys between Rail and LUL, before applying the MOIRA assumption to split the journeys

For example, if a passenger is travelling from Walthamstow Central to London Z2356, the passenger can travel as far a zone 2. The MOIRA assumptions state that a proportion of travellers will use the Rail services and a proportion will use the LUL services depending on what ticket type (full, reduced, season) they hold. Having obtained the Rail proportion, we then use again MOIRA assumptions based on LATS 2001 to assign a rail station as a destination, instead of the travelcard destination. For the Walthamstow Central to London Z2356 example, MOIRA suggests that passengers can alight at Hackney Downs and Bethnal Green.

Where there was insufficient data in the 2001 LATS to generate the split for a particular station we keep the flows as they appeared in the LENNON sales data.

Category 6 – Origin or Destination a Boundary Zone

For all flows where the origin or destination was a boundary zone in London, we do not know where the passenger started or ended their journey, therefore such records are excluded from the Station usage file.

Passengers purchasing a ticket starting at a boundary zone will already be in possession of a ticket that is valid out to that boundary zone. We were unable to tell at which station they started their journey, as they used the ticket that they already owned to travel from their starting station to the boundary zone.

For example, a passenger with a zone 1 and 2 Travelcard who wanted to travel from London to Portsmouth would purchase a ticket from boundary zone 2 to Portsmouth. However, we had no way of knowing at which station they started their journey. It could have been any station within Travelcard zones 1 and 2. There are five different boundary zones: Boundary Zone 2, 3, 4, 5 and 6.

Category 7 – Non-National Rail Stations and Invalid Flows

This final category contains all those flows that appeared to be invalid, and therefore for which the journeys are excluded from the entries and exits figures. This includes:

- Invalid flows, in particular flows where the origin station equalled the destination station.
- Flows involving invalid codes that were not proper stations.

7 Interchanges Methodology

We obtained an estimate of the number of people interchanging at each station by combining the number of journeys made on each flow from LENNON (from our origin/destination file) with the information in the Central Allocations File (CAF).

The CAF is an output of the ORCATS system used to determine the allocation of passenger revenue between TOCs. Since ORCATS is a model, the CAF contains estimates rather than actual journeys. However, it is used throughout the rail industry, so it is an appropriate source of data to use for this purpose. Since CAFs are updated with the timetable, not with financial years, no CAF will match the LENNON data exactly. We used the December 2007 CAF in this study, which relates to the timetable in operation for substantial portion of the 2007/8 financial year covered by the LENNON data.

The CAF contains:

- Origin and destination
- Route alternatives for each origin and destination
- Ticket type data
- For each flow, the proportion of passengers who choose to travel on each route alternative as calculated by the ORCATS model

This methodology was the same as that which we employed to calculate the number of passengers interchanging at each of the stations in 2005/6 and 2006/7. An overview of the ORCATS allocation process can be found in Appendix 2.

8 Regions, Counties and Districts

In 2006/7 we received a file from ATOC, showing the District or the Unitary Authority where each of the proper rail stations is located. This file was also cross-checked with another file that ORR provided us. After having that information for each station, we also download data from the ONS[2] website, in order to match each district to a county and a region (GOR). Stations new for 2007/8 have had this information filled in by reference to the websites of the districts and authorities concerned.

9 Limitations of the LENNON data

[2] http://www.statistics.gov.uk/geography/geographic_area_listings/administrative.asp#04

The LENNON database captures ticket sales for the entire national rail network from many different input machines. It is as a consequence a very large data set. With all large data sources there may be input errors. Such errors are more likely to occur in the journeys, rather than revenue fields. We perform checks on the data, but due to the size and complexity of the dataset we are not able to validate each and every entry.

We have used similar information extensively in the last ten years or more, and have found the data to be reliable, particularly when examining the data at an aggregated level.

There are a number of areas where we know that LENNON does not capture the data precisely, or instances where it is not possible to derive passenger journeys from ticket sales data. These areas are expanded upon below.

9.1 Origins / destinations not national rail stations

The data in LENNON from which the O-D Matrix is derived is based on ticket transactions. In order for the data to be included in the O-D Matrix it must include an origin station and a destination station. However if this is not the case then the data will automatically be excluded (see Section 4).

9.2 Travelcards

As Travelcards are for multi-modal travel they allow the purchaser to make journeys on the rail system and on other modes. Equally, tickets purchased elsewhere on the local transport system will be valid for rail travel. Therefore LENNON, and hence the O-D Matrix, give only a partial picture of the rail travel in conurbation areas. Such areas include: Birmingham, Glasgow, Leeds, Liverpool, Manchester, Newcastle and Sheffield.

London is treated differently. An estimate of the relative usage of stations is produced by using the Travelcard Diary Survey data for the period in question. This gives a breakdown of flows into Zonal combinations (Z1-2, Z1-3, etc. and not Zone 1) for Day and Period Travelcards separately. The London Area Travel Survey (LATS) is then used to convert these zonal pairs into pairs of stations.

In summary, this year's O-D Matrix contains reasonably robust estimates of journeys within London, but not for other conurbation areas where travelcards are widely used. We are investigating how such information could be improved in the future.

9.3 Return and Single Journey Tickets

It is possible that on certain routes the cost of a return ticket could be lower than a single ticket. This leads to the cheaper return ticket being purchased even though the passenger has no intention of making the return journey by rail. This results in two journeys being recorded instead of one.

9.4 Multiple Tickets

Special ticket offers may only be available between certain stations, for example under a promotion by one of the train companies. In these cases a local ticket may be bought to gain access to a main station, and a second special offer ticket bought for the main leg of the journey. This results in two journeys being recorded in the O-D Matrix and will not accurately represent the through rail journey being undertaken.

9.5 Rail Staff Passes

Prior to the privatisation of the rail network, British Rail employees and their families were eligible for free or reduced rate rail travel, a benefit which has continued for certain staff. While representing a very small proportion of travel, such journeys will not be recorded in the O-D Matrix.

9.6 Ticketless Travel / Fare Evasion

Across the rail network, there will usually be a small proportion of passengers who travel without purchasing a ticket. This is referred to as ticketless travel. Since LENNON data is derived from ticket transactions, it cannot reflect this travel.

9.7 Other Rail Systems

There are a number of rail systems in operation in the country whose ticket sales are not covered by LENNON. Heathrow Express and Eurostar are the two major examples, whose ticket sales data were not available, and these operators are therefore not included in the O-D Matrix.

In addition, some tickets of franchised rail operators may be sold outside LENNON. Note, however, that for the main two such cases, Gatwick Express and Stansted Express, non-LENNON data has been obtained for this project, and is included in the O-D Matrix.

Appendices

Appendix 1 - Checks

Four specific checks on the data have been carried out. All the stations flagged up by the first two checks are marked in the accompanying spreadsheet, together with explanations, where possible. In this section, we explain these checks in more detail. We also performed two others (Checks 3 and 4) to help validate the results, which do not appear in the spreadsheet, but are commented upon in this appendix.

Check 1: Unequal Entries & Exits

The first check highlights all the stations at which the number of entries differed significantly from the number of exits. A station was considered to fail this check if either its entries or its exits individually constituted less than 40% of its total entries and exits.

In 2007/8 32 stations failed this test. This number accounts to 1.3% of all the stations, with the total number of journeys being only 0.013% of the total journeys. Only 4 out of the 32 stations had more than 15,000 entries and exits for the year, and none of them had more than 50,000 entries and exits.

Check 2: Large Changes in Usage

The second check identified all stations at which usage has changed significantly since the previous year available, 2006/7. The results showed an 8% increase in total entries and exits (E&X) overall. A station is deemed to fail this test if its change in E&X differs from this norm by more than 20%. Only stations whose E&X exceeded 15,000 were considered in this check.

In total 250 stations failed that check; that is 12% of the stations whose total entries and exits exceeded 15,000.

The six most significant increases are for stations 'in groups some of which have no ticket offices' which have been analysed differently this time, as described above.

Table A1-1 – The Six Largest Increases in Total Flow

NLC	Station	Entries & Exits		Increase
		2006/7	2007/8	
5688	Farnborough North	9214	344284	3736%
6498	Newark Castle	2904	324202	11162%
5412	Dorking Deepdene	2475	495310	20012%
5962	Dorchester West	173	65977	38238%
8584	Wakefield Kirkgate	769	360357	46842%
6531	Thorne South	79	100591	127330%

There are many other reasons why stations can fail this check, in particular that demand may have increased or decreased significantly at individual stations. Reasons causing stations to fail the check, including those provided in previous reports, have been listed below for completeness. In addition, where possible a reason was assigned to the stations failing the check. A reason was not identified in every case.

New Station

Stations that are newly opened, or have been opened within the past few years, can reasonably show significant growth. The main example Liverpool South Parkway, which showed an increase in E&X from 288,844 passes in 2006/7 to 419,650 in 2007/8, an increase of 45%.

Gating

Installation of ticket gates can significantly affect not only the usage figures at that station, but also those at neighbouring stations. The gates help to ensure that customers purchase tickets, but customers may also alter their travel patterns to avoid gated stations. We would expect travel patterns to be most affected in the months following the installation of the gates.

Change in Service Pattern

Alterations in service frequency or stopping pattern would be expected to alter station usage figures. This is particularly apparent where a group of consecutive stations show similar increases or decreases. Again, this can be a long-term trend.

Ticket Issuing Facilities Changes or Product Changes

Some London stations have both underground and National Rail trains operating. LENNON does not capture tickets sold by London Underground, only those sold by TOCs. Changes in ticket facilities provided by TOCs, for example the provision of ticket machines, can therefore increase the ticket sales captured by the system.

Product changes can have an affect on passengers' purchasing patterns at rail outlets thus affecting station usage data. For example, the introduction of Oyster cards at rail outlets can affect stations inside the Travelcard boundary in the London area.

Engineering Work

Significant engineering work can alter customers' travel patterns.

Tourism

Stations near to tourist attractions may show significant changes in usage as a result of weather, promotions or other factors, which affect tourists' journeys.

Special Stations

Some stations serve a particular activity or business. Some fluctuation in usage of such stations is reasonable. Such activities include:

- Racecourses
- Sports Events
- Exhibition Centre Glasgow
- Airports

Trend of Growth or Decline

For stations with a history of growth or decline, it is reasonable to expect this trend to continue. There are many possible reasons for these trends, such as demographic and employment changes.

Changes in the Sales of Individual Ticket Types

Miscoding of ticket information entered into LENNON can alter station usage results, although this would not be reflecting an actual change in customers' journeys.

Check 3: Group Stations

The third check involved identifying all stations that are part of a station group. Our processes will have assigned these passengers to a specific station within the group. They are marked in the spreadsheet with the name of the group. The user of this data may wish to filter on the 'Group Station NLC' column, or create pivot tables, to investigate the results at a group level. For these groups we are expecting changes compared to last year. That is because of the new methodology applied to groups with some stations not having ticket offices.

Table A1-2 shows all the groups lacking some ticket offices, for which the process has changed. Notable amongst these are Gainsborough, Pontefract, Tyndrum and Dorchester which were identified last year as having suspect results. But Bedford, Dorking, Farnborough, Helensborough, Maidstone, Newark, Thorne and Wakefield also show the expected radical changes.

Table A1-3 shows the groups with all ticket offices for which there has been a change of more than 20% in journeys for at least one of the stations. There are notable changes for Birmingham, Liverpool and Manchester. Checks show that the process is operating as expected – The changes seem to be due to the relatively small proportion of flows with origin and destination defined as actual stations rather than the group station, which can cause the results to be very sensitive to changes in these flows.

Please note that these changes were not compensated to allow for the overall increase in journeys.

Table A1-2 Changes in Trips at Group Stations – Some Stations with No Ticket Offices

Station Group	Station NLC	Station Name	Journeys 2006/7	Journeys 2007/8	Change
ARDROSSAN BR	9453	Ardrossan Harbour	68,332	85,252	**25%**
ARDROSSAN BR	9569	Ardrossan South Beach	191,783	201,387	5%
ARDROSSAN BR	9455	Ardrossan Town	16,523	15,152	-8%
BEDFORD BR	1512	Bedford	3,033,826	3,184,488	5%
BEDFORD BR	1510	Bedford St Johns	942	12,106	**1186%**
BLACKPOOL BR	2739	Blackpool North	1,673,031	1,684,803	1%
BLACKPOOL BR	2738	Blackpool Pleasure Beach	30,015	40,597	**35%**
BLACKPOOL BR	2740	Blackpool South	94,083	105,192	12%
BRISTOL BR	3245	Bedminster	43,378	43,146	-1%
BRISTOL BR	3230	Bristol Parkway	1,789,848	1,897,941	6%
BRISTOL BR	3231	Bristol Temple Meads	6,548,858	7,082,098	8%
BRISTOL BR	3235	Filton Abbeywood	410,631	457,611	11%
BRISTOL BR	3237	Keynsham	209,594	231,327	10%
BRISTOL BR	3225	Lawrence Hill	68,370	55,731	-18%
BRISTOL BR	3250	Stapleton Road	98,447	72,181	**-27%**
BURNLEY BR	2743	Burnley Barracks	1,776	2,110	19%
BURNLEY BR	2550	Burnley Central	110,993	116,270	5%
BURNLEY BR	2549	Burnley Manchester Road	167,160	178,869	7%
DORCHESTER BR	5961	Dorchester South	415,066	389,699	-6%
DORCHESTER BR	5962	Dorchester West	173	65,977	**38139%**
DORKING BR	5357	Dorking	1,362,275	1,078,444	**-21%**
DORKING BR	5412	Dorking Deepdene	2,475	495,310	**19913%**
DORKING BR	5297	Dorking West	80	52	**-35%**
EXETER BR	5755	Exeter Central	1,292,493	1,385,317	7%
EXETER BR	3410	Exeter St Davids	1,800,832	1,982,436	10%
EXETER BR	3414	Exeter St Thomas	80,199	82,677	3%
FALKIRK BR	9930	Falkirk Grahamston	662,246	553,316	-16%
FALKIRK BR	9931	Falkirk High	882,674	1,035,513	17%
FARNBOROUGH BR	5521	Farnborough Main	2,748,036	2,653,774	-3%
FARNBOROUGH BR	5688	Farnborough North	9,214	344,284	**3636%**
GAINSBOROUGH BR	6465	Gainsborough Central	33,217	1,127	**-97%**
GAINSBOROUGH BR	6424	Gainsborough Lea Road	106,635	118,853	11%
LYMINGTON BR	5892	Lymington Pier	115,175	161,539	**40%**
LYMINGTON BR	5887	Lymington Town	171,260	174,831	2%
MAIDSTONE BR	5237	Maidstone Barracks	4,191	399	**-90%**
MAIDSTONE BR	5115	Maidstone East	1,877,269	1,978,463	5%

Station Group	Station NLC	Station Name	Journeys		
			2006/7	2007/8	Change
MAIDSTONE BR	5222	Maidstone West	415,299	550,958	**33%**
NEWARK BR	6498	Newark Castle	2,904	324,202	**11063%**
NEWARK BR	6499	Newark North Gate	1,187,545	923,017	**-22%**
NEWBURY BR	3074	Newbury	1,439,174	1,479,715	3%
NEWBURY BR	3071	Newbury Racecourse	68,637	63,878	-7%
NEWHAVEN BR	5330	Newhaven Harbour	59,780	52,731	-12%
NEWHAVEN BR	5331	Newhaven Town	261,349	302,575	16%
PLYMOUTH BR	3579	Devonport	19,654	17,450	-11%
PLYMOUTH BR	3588	Dockyard	5,334	4,923	-8%
PLYMOUTH BR	3571	Keyham	7,977	5,055	**-37%**
PLYMOUTH BR	3580	Plymouth	1,845,958	2,026,852	10%
PLYMOUTH BR	3590	St Budeaux Ferry Road	1,037	1,199	16%
PLYMOUTH BR	3592	St Budeaux Victoria Road	5,263	5,194	-1%
PONTEFRACT BR	8540	Pontefract Baghill	64,801	4,331	**-93%**
PONTEFRACT BR	8548	Pontefract Monkhill	65,872	126,664	**92%**
THORNE BR	6530	Thorne North	249,922	121,580	**-51%**
THORNE BR	6531	Thorne South	79	100,591	**127231%**
TYNDRUM BR	8728	Tyndrum Lower	17	4,587	**26883%**
TYNDRUM BR	8838	Upper Tyndrum	7,529	3,237	**-57%**
WAKEFIELD BR	8584	Wakefield Kirkgate	769	360,357	**46742%**
WAKEFIELD BR	8591	Wakefield Westgate	1,877,980	1,610,950	-14%
WREXHAM BR	4486	Wrexham Central	20,457	19,736	-4%
WREXHAM BR	4487	Wrexham General	436,468	487,719	12%

Table A1-3 Changes in Trips at Group Stations – All Stations with Ticket Offices

Station Group	Station NLC	Station Name	Journeys		
			2006/7	2007/8	Change
BIRMINGHAM BR	4515	Birmingham Moor Street	2,680,846	646,872	**-76%**
BIRMINGHAM BR	1127	Birmingham New Street	14,525,874	17,114,741	18%
BIRMINGHAM BR	1006	Birmingham Snow Hill	1,938,949	2,340,294	**21%**
CARDIFF BR	3899	Cardiff Central	9,126,924	9,875,269	8%
CARDIFF BR	3900	Cardiff Queen Street	2,231,784	2,485,784	11%
CARDIFF BR	3815	Cardiff Bay	404,050	518,534	**28%**
EDENBRIDGE BR	5473	Edenbridge	130,453	100,227	**-23%**
EDENBRIDGE BR	5359	Edenbridge Town	310,430	390,971	**26%**

Station Group	Station NLC	Station Name	Journeys 2006/7	Journeys 2007/8	Journeys Change
FOLKESTONE BR	5035	Folkestone Central	905,763	944,800	4%
FOLKESTONE BR	5027	Folkestone West	153,976	195,218	**27%**
GUILDFORD BR	5631	Guildford	7,186,050	7,983,351	11%
GUILDFORD BR	5632	London Road (Guildford)	412,359	641,262	**56%**
HELENSBURGH BR	9982	Helensburgh Upper	600	48	**-92%**
HELENSBURGH BR	9981	Helensburgh Central	928,812	911,610	-2%
LIVERPOOL BR	2246	Liverpool Lime Street	6,377,361	4,387,317	**-31%**
LIVERPOOL BR	2242	Liverpool Central	7,169,615	8,890,177	**24%**
LIVERPOOL BR	2244	Liverpool James Street	1,552,223	1,930,289	**24%**
LIVERPOOL BR	2226	Moorfields	1,577,538	2,082,424	**32%**
MANCHESTER BR	2966	Manchester Oxford Road	4,330,753	1,213,221	**-72%**
MANCHESTER BR	2970	Manchester Victoria	5,060,047	3,781,384	**-25%**
MANCHESTER BR	2963	Deansgate	97,780	120,642	**23%**
MANCHESTER BR	2968	Manchester Piccadilly	14,513,541	20,655,642	**42%**
PENGE BR	5072	Penge East	1,188,498	1,217,030	2%
PENGE BR	5378	Penge West	195,412	264,534	**35%**
READING BR	3149	Reading	14,367,753	14,562,506	1%
READING BR	3160	Reading West	148,308	430,079	**190%**
WARRINGTON BR	2390	Warrington Central	968,741	869,316	-10%
WARRINGTON BR	2384	Warrington Bank Quay	830,485	1,042,758	**26%**
WEST HAMPSTEAD BR	1421	West Hampstead	1,896,939	1,108,126	**-42%**
WEST HAMPSTEAD BR	1525	West Hampstead Thameslink	3,049,154	4,006,121	**31%**
WIGAN BR	2406	Wigan Wallgate	1,285,027	918,431	**-29%**
WIGAN BR	2363	Wigan North Western	544,314	998,596	**83%**

Check 4: Stations with Rail Links

The fourth check involved those stations which had contributions of journeys from rail link tickets added. Table A1-4 shows those stations having journeys associated with rail–link tickets added, and which have experienced more than 20% growth since 2006/7. Outstanding among these is Prestwick International Airport, showing a 401% increase. Of course not all of the increase will necessarily be due to the Rail-Link 'add on'.

Table A1.4 – Stations with Rail-Link Tickets having more than 20% Increase in Journeys

Station NLC	Station Name	Journeys			Rail Link Ticket Name
		2006/7	2007/8	Increase	
9544	Prestwick Int. Airport	113,747	569,708	401%	Prestwick Airport Discount
2187	Bache	53,016	88,074	66%	Chester Zoo
7268	Lowestoft	247,536	410,244	66%	Lowestoft Bus
7328	Great Yarmouth	282,530	416,713	47%	Great Yarmouth Bus Link
3871	Ystrad Rhondda	49,434	72,507	47%	Maerdy Bus
5892	Lymington Pier	115,175	161,539	40%	Wightlink Ltd to Yarmouth
7008	Bury St Edmunds	275,403	373,739	36%	Bury St Edmunds Bus
5138	Greenhithe	859,973	1,137,129	32%	Bluewater through Tickets
7309	Norwich	2,711,911	3,449,928	27%	Norwich + Bus
9453	Ardrossan Harbour	68,332	85,252	25%	Brodick
7439	Benfleet	2,480,039	2,989,139	21%	Canvey Bus Zone C1
5129	West Malling	645,179	776,988	20%	Kings Hill Bus
4639	Cradley Heath	242,498	288,332	19%	Cradley H+Bus WM
7217	Ipswich	2,402,051	2,807,396	17%	Ipswich Area Bus Ticket

Appendix 2 - Overview of the ORCATS Allocation Process

This section gives an outline of the Central Allocations File (CAF), which is used in producing the interchange figures, and the ORCATS process which is used to create the CAF.

Most of the train tickets that are sold are interavailable – the customer has a choice of routes and operators. For example, when a customer buys a ticket to travel from Leicester to Leeds, that customer may travel on various combinations of Midland Mainline, GNER and Virgin Trains, and may interchange at Doncaster, Sheffield or Derby. LENNON captures the sale of the ticket, but unless the ticket has stringent route restrictions, the route actually taken by the customer is not recorded.

The route taken by any particular customer may never be known, but some route options are more attractive than others. The customer is more likely to choose a faster, more frequent service than a slower, less frequent one. This likelihood can be translated into the proportions of customers choosing each route option, on a particular flow. (A 'flow' represents all journeys from a given origin station to a given destination station, irrespective of the route taken.) The revenue received from all customers on that flow should be split between different operators to reflect the proportion of customers which each operator carried.

ORCATS was developed to model the choice made by the customers, and to allow revenue to be split between operators. It applies passenger choice modelling to the train timetable, to determine the relative attractiveness of different route alternatives. It then weights the results by journey mileage.

For any given timetable, ORCATS works out the possible routes between each origin and destination, and calculates the percentage of the passengers that are expected to choose each route based on the services in that timetable.

The output from ORCATS is the Central Allocations File (CAF). This lists the proportion of journeys on each flow (or origin-destination pair) estimated to be made by each route alternative. For journeys involving interchanges, each leg of the journey is listed. By combining this information with LENNON data, which contains actual ticket sales figures for all flows, we have estimated the number of interchanges occurring at individual stations.

DeltaRail