Station Usage and Demand Forecasts for Newly Opened Railway Lines and Stations

Final Report

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Executive Summary

Introduction

1. The primary objective of the "Station Usage and Demand Forecasting for Newly Opened Railway Lines and Stations", from this point known as the "New Stations" study, is to investigate whether or not actual demand at new stations is significantly different from forecast, and if so, what are the reasons for this.

2. The study comprised two Phases, the first Phase was to collate station forecasts and supporting information and models to understand the methodologies used, the elements of rail demand included in the forecasts and the performance of the demand forecasts compared to observed demand.

3. The second Phase of the study was originally intended to consider a subset of these stations and to understand whether the forecasting models used were robust by undertaking a backcasting exercise with outturn data for the input variables. However the lack of availability of demand forecasting models constrained this and instead the scope was widened to consider:

   - evidence of demand abstraction
   - the relative proportion of demand produced by and attracted to stations and its concentration
   - the impact of component variables in trip rate analysis and the performance of a generic station forecasting model
   - the preparation of a station demand forecasting checklist (including guidance on undertaking pr and post implementation surveys) to assist Department for Transport (DfT) and Transport Scotland (TS) in guiding promoters.

Collation of Station Forecasts

4. Prior to commissioning the study the DfT identified 40 stations which had opened since privatisation. The promoters of these included Local Authorities, London Boroughs, private developers and train operating companies. Business cases for the new stations would have been submitted to OPRAF, Strategic Rail Authority, DfT and TS for approval. However, possibly reflecting the number of changes to the franchising authority and the different avenues by which new stations are approved (for example through franchise bids and Rail Passenger Partnership funding), there is no one central repository where the business cases for all stations could be found. Furthermore, IT developments over the last 20 years have meant that business cases for stations delivered in the mid-1990s may not be available electronically or in electronic formats no longer supported.

5. The DfT and TS facilitated the collation of the station business cases through a search of archives and by contacting promoters of new stations and consultants.

6. Business Cases for a number of new stations had been prepared in order to apply for SRA/DfT Rail Passenger Partnership funding from DfT (funding for joint bids between operators and local authorities). The original business cases (and

forecasting models) prepared by promoters were therefore reviewed by consultants on behalf of DfT. In many instances it was only the RPP consultants review of the business case that was available and (since these reviews were usually brief) this constrained the review of forecasting methodologies for the New Stations study.

7. In total, information on the business cases for 27 of the 40 stations were made available for our study, which was sufficient to draw some conclusions on the performance of demand forecasting for new stations.

8. As promoters commission and fund the demand forecasting work we recommend that they request the demand forecasting reports and models from their consultants (together with model documentation) and store them electronically. The DfT and TS should also request this information as part of any submission and should also ask for forecasts to be presented in a consistent manner.

Overview of Stations Reviewed

9. In order to assist in understanding the types of stations that have opened, and whether there are any patterns on the demand forecasting methodologies used and performance of forecasts against outturn demand, the DfT categorised the new stations according to their function. Figure 1 below shows all the new stations that have opened since privatisation and their categorisation. Those stations in bold text are those for which business cases and demand forecasts were made available for the New Stations study.

FIGURE 1 NEW RAIL STATIONS OPENED SINCE PRIVATISATION

		Residential		Park and Ride		Destination stations		
New Station	Opening Date	London & SE	Other residential	Long Distance Inter-urban parkway	Park and Ride	Airport	Work / Leisure	Part of a New Line
Alloa	19.05.2008		✓		✓		✓	✓
Aylesbury Vale Parkway	14.12.2008	✓			✓			
Beauly	15.04.2002		✓					
Braintree Freeport	08.11.1999	✓					✓	
Brighouse	29.05.2000		✓					
Brunstane	02.06.2002		✓					✓
Chandlers Ford	12.12.2004	✓						
Chatelherault	11.12.2005		✓		✓			✓
Coleshill Parkway	19.08.2007				✓			
Corby	23.02.2009		✓				✓	✓
Crosskeys	07.06.2008		✓					✓
Dunfermline Queen Margaret	25.01.2000		✓					
East Midlands Airport Parkway	26.01.2009			✓		✓		
Ebbw Vale Parkway	06.02.2008				✓			✓
Edinburgh Park	08.12.2003						✓	
Gartcosh	09.05.2005		✓		✓			
Glasshoughton	12.12.2004		✓					
Horwich Parkway	30.05.1999				✓		✓	
Howwood	12.03.2001		✓					
Imperial Wharf	28.09.2009	✓					✓	
Kelvindale	26.09.2005		✓					
Lanhilleth	27.04.2008		✓			✓		✓
Larkhall	11.12.2005		✓		✓			✓
Laurencekirk	18.05.2009		✓		✓			
Lea Green	17.09.2000		✓					
Liverpool South Parkway	11.06.2006				✓	✓		
Llanharan	09.12.2007		✓					
Llantwit Major	10.06.2005		✓					✓
Luton Airport Parkway	21.11.1999	✓			✓	✓		
Merryton	11.12.2005		✓		✓			✓
Mitcham Eastfields	02.06.2008	✓						
Newbridge	06.02.2008		✓					✓
Newcraighall	02.06.2002				✓			✓
Rhoose - CIP	10.06.2005		✓			✓		✓
Risca and Pontyminster	06.02.2008		✓					✓
Rogerstone	06.02.2008		✓					✓
Shepherds Bush	29.09.2008	✓					✓	
Warwick Parkway	08.10.2000			✓				
Wavertree Technology Park	13.08.2000		✓				✓	
West Brompton	30.05.1999	✓					✓	

Review of Forecasting Methodologies and Assessment of Forecasting Performance

10. The review of the demand forecasts for the stations considered the methodology used to forecast demand, whether demand abstraction had been modelled and how underlying demand growth and demand build-up had been modelled. Demand abstraction was a focus area for the study as anecdotally it is believed to occur however there is little or no evidence of such. Clearly if significant demand at new stations is simply passengers transferring from existing stations then this needs to be reflected in business cases.

11. The assumptions used in the demand modelling were also reviewed, particularly the train service specification that had been assumed in the demand modelling and how this compares with what actually operates. Since train frequency, journey time and destinations served are key drivers of demand, if those which are delivered are different from what is assumed in the modelling then one would expect the forecast demand to be different from actual demand. Whilst some demand forecasts were prepared using mode choice models, which considered competing modes, the documentation did not state the assumptions made about the times and costs of the other modes. This important omission is recognised and a recommendation made in the New Stations Demand Forecasting Checklist accordingly.

12. The level of information provided on how demand forecasts were prepared varied significantly between stations. Some forecasts were supported by documented information of only a couple of pages, whilst others were supported by detailed sections of business case reports. For 5 stations the documentation was only available in the form of brief RPP reviews, which were not sufficiently detailed to allow a full assessment of the demand forecasting approach used to prepare the forecasts.

13. The majority of demand forecasts used a trip rate approach, of varying degrees of complexity. In some instances (generally Parkway stations) these were supplemented by station choice models. In some instances mode choice models were used in conjunction with trip rate models. For 4 stations (3 of which were on a new line) strategic demand forecasting models were used to forecast demand for stations. The methodology used to forecast demand for 3 of the stations was not specified. Where demand abstraction from existing stations was likely to occur the review found that it was considered in the forecasting methodology.

14. What the review did confirm was that every station has unique characteristics and there is no one modelling technique that can be used to forecast demand. It is critical that forecasters be explicit which factors have been taken into account in the modelling.

15. Demand build-up at the new station and forecasts of underlying rail demand growth were generally only considered at a high level. However for stations opened recently it will be both the "point estimate" of demand and the demand build-up assumptions which form the demand forecast. It will not be possible to confirm whether either or both is accurate until a number of years after the station is open (when observed demand will show the actual build-up effect and "steady state" demand).

16. Passenger journeys information from LENNON (Latest Earnings Network Nationally OverNight) ticket sales data for the year 2008/9 was used as the measure of observed demand. This includes trips produced by and attracted to the new station, and was in a readily accessible format having been prepared for the MOIRA Replacement project.

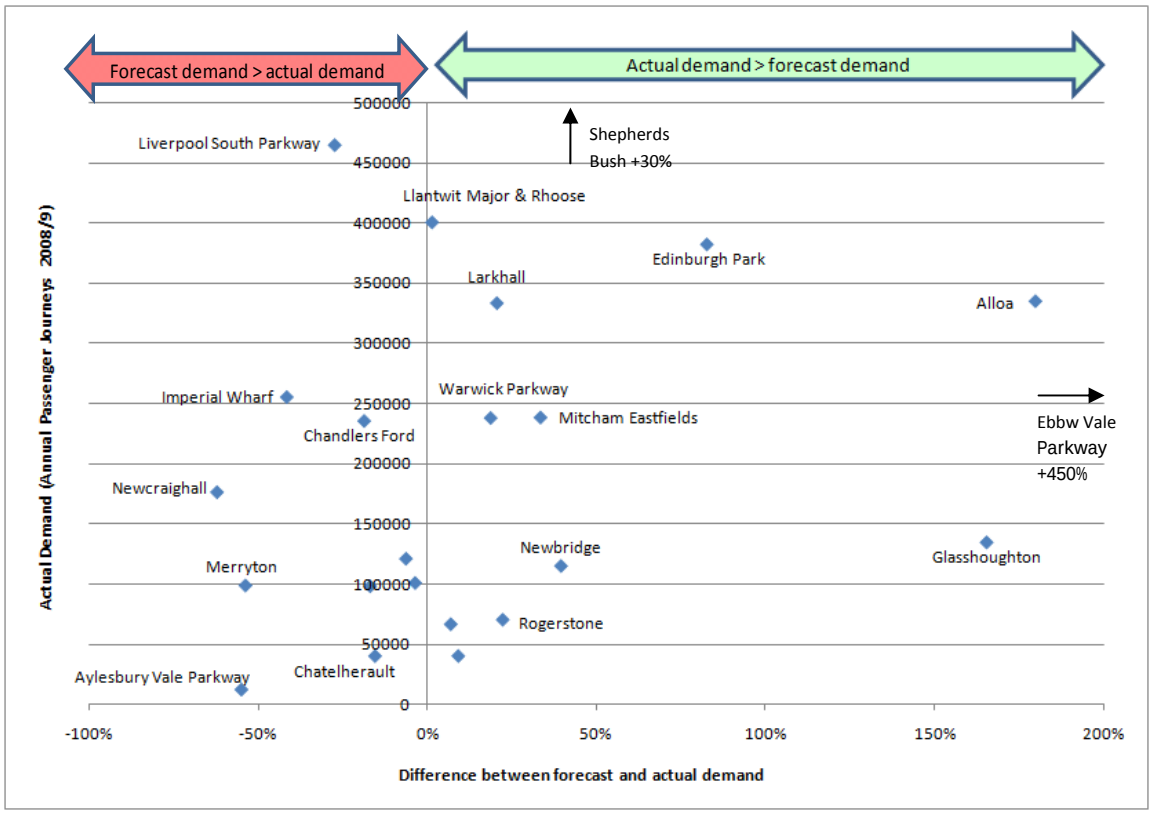
17. The format in which the demand forecasts were prepared often presented a challenge when trying to compare forecasts with observed demand. Demand forecasts were often presented as daily or peak period journeys (with no annualisation factor specified). On more than one occasion it was not made clear whether the peak period was morning or evening. Sometimes forecasts were only presented at 5-yearly intervals (with none of the years corresponding with the actual opening year). Rarely was the forecast opening year consistent with the actual opening year.

18. In many instances it was therefore necessary to convert the demand forecasts such that they were consistent with the observed demand before being able to judge the accuracy of the demand forecasts. Where possible the conversion used documented information provided in the supporting reports.

19. To allow the DfT and TS to review submissions for funding and compare forecasts more easily it is recommended that promoters are required to present forecasts in a consistent manner.

20. Figure 2 shows the comparison of the forecast and observed rail demand at all those new stations for which demand forecasts were available.

FIGURE 2 COMPARISON OF FORECAST AND OBSERVED PASSENGER DEMAND



21. Given the paucity of industry guidelines for forecasting demand for new stations, and the limited evidence base, we took the view that demand forecasts were reasonably accurate if they were within +/- 20% of observed demand.

22. The most obvious outliers in Figure 2 are Ebbw Vale Parkway station and Shepherds Bush. The forecast demand for Ebbw Vale Parkway station was 45,000 passengers, compared to the 2008/9 actual demand of 252,000. The methodology used to forecast demand was a logit mode choice model (based on road side interviews and generalised journey times) together with an uplift applied to reflect trip generation. Two of the reasons for the under-forecast of demand have been identified as:

- The exclusion (as requested by the Strategic Rail Authority) of rail demand arising from regeneration of the area and also the assumption that the local steelworks would remain open; and
- The fact that the rail service operates to Cardiff, rather than Newport (as assumed in the modelling).

23. The comparison of forecast and observed demand for Shepherds Bush should be treated with caution as the only observed demand information that was made available for the study was a one-day count. Since the demand forecasts were prepared for the peak period, this study had to make a number of high-level assumptions to convert the forecasts into a daily forecast.

24. The majority of the other outliers in Figure 2 can be explained to be due to one of three factors:

- The outturn values of input assumptions being significantly different to those assumed in the forecasts (Aylesbury Vale and Liverpool South Parkway)
- Forecasting methodologies not reflecting local factors (Imperial Wharf)
- Misunderstanding of the likely "function" of the station (Newcraighall and Glasshoughton)

25. The original demand forecasts for Alloa were only high level estimates. It is understood that much of the demand at Alloa is accounted for by mode switch from bus- it is not clear whether the high level estimates considered the potential for mode switch (or understood the size of the bus market).

26. The reason for Merryton forecasts being considerably higher than actual is not fully understood – as demand at its two neighbouring stations on the Larkhall – Milngavie line were reasonably accurately forecast using a four-stage land use model (despite this modelling approach not conventionally thought to be appropriate for individual station forecasts). TS have suggested that the reason may be that the car park is so small (c 30 spaces) that there is suppressed demand.

27. Insufficient information was provided on the forecasting methodology for Edinburgh Park to comment on the likely reason for the under-forecast. However it should be noted that this is the only station which is categorised as "Destination" alone. It is possible that the forecasts (which used a trip rate model and logit mode choice model) did not take into account demand abstraction from South Gyle.

28. There appeared to be no pattern of under or over forecasting when the stations were considered at either station categorisation level or buy methodology used. However, given the relatively low total number of stations being considered, and the large number of combinations of categorisations and methodologies, the sample sizes at this level were of insufficient size to credibly draw conclusions.

29. The analysis shows that demand forecasts should reflect a consideration of the markets that will be served by the new station and the importance of sensitivity tests which would indicate the key risks to the forecasts.

Station Demand BackCasting

30. Given the information and models supplied for the project, a backcasting exercise could only be undertaken for only Aylesbury Vale Parkway and Liverpool South Parkway.

31. Populating the trip rate model used to forecast demand for Aylesbury Vale Parkway) with outturn housing development information (reflecting downturn in development during the recession) resulted in the model producing forecasts of demand that were within 10% of demand, where previously they had been 100% out. This confirmed that the methodology used for the forecasts was fit for purpose.

32. When the modelling for Liverpool South Parkway was updated with the outturn frequency of the bus service between the station and John Lennon Airport (which is served by the station) there was a significant improvement in the forecast demand, with actual demand being only 11% lower than forecast, compared to 27% lower as originally forecast.

33. Reflecting on the methodologies used to forecast demand for stations in the study it is considered that there is probably limited merit in trying to further the industry forecasting guidance through backcasting exercises. Backcasting will often require updating existing datasets or collating new ones which is costly and time-consuming. It is considered that understanding more about the parameters applied to input variables (for example trip rates or mode specific constants) and collating evidence on these is likely to prove more valuable.

Demand Abstraction

34. The study interrogated observed time series rail demand data to try to identify evidence of new stations abstracting demand from existing stations, something which is anecdotally believed.

35. The approach used by the study to identify evidence of abstraction was consistent with that proposed by Blainey and Preston (University of Southampton), however we considered 4-weekly time series data as well as annual time series data. The approach sought to identify abstraction by comparing changes in passenger demand growth at neighbouring stations (from which people could be expected to transfer to using the new station) with growth in demand at a "counterfactual station" – one which was similar in characteristics and location to the neighbouring station but from which abstraction was unlikely.

36. Analysis of the annual time series data identified almost no evidence of demand abstraction, however the analysis of time series data by period (which could only

be tested for 9 stations as LENNON data by period is only retained by the LENNON archive for four years) pointed to some evidence of abstraction at Abergavenny (demand transferring to Ebbw Vale Parkway), Water Orton (demand transferring to Coleshill Parkway) and Kensington Olympia (demand transferring to Shepherds Bush). Three stations have opened too recently (in 2009) for any evidence of abstraction to emerge.

37. Analysis of time series passenger demand data at period level for carefully selected neighbouring and counterfactual stations does appear to be able to be used to provide evidence of abstraction. To overcome the constraints on the availability of historic LENNON data it is recommended that when a new station opens, the potential abstraction and counterfactual stations are identified and passenger demand at period level is collated for the previous three years and added to each year. Only two to three years after the opening date is it possible to identify whether there is any evidence of demand abstraction.

Producer / Attractor Analysis

38. The review of demand forecasting methodologies found that many focussed on forecasting trips produced by a new station, where "produced" is defined as those where the starting point of the return trip is the new station, for example trips made by people living in the local area. Very few specifically forecast demand attracted to the new station (where the home station is elsewhere and people are travelling to the new station to visit), although it is recognised that trip rate approaches implicitly assume that some of the trips forecast are "attractor trips".

39. Our analysis of LENNON passenger journeys data found that on average 27% of passenger journeys to or from those new stations which were not considered to be "destination stations" was accounted for by "attractor trips". For stations considered to be "destination stations" (which, with one exception were also considered to be either Parkway or residential stations) on average 48% of demand was accounted for by "attractor" trips. It is noted however that this analysis will be somewhat affected by the point of sale of season tickets, with passengers sometimes finding it more convenient to purchase these tickets at stations other than their home station (often buying them at their destination station).

40. This highlights the need for forecasters to understand the market which the station will serve, and choose a forecasting methodology accordingly. Not doing so has considerable implications: for example at Glasshoughton where a trip rate approach alone was used to forecast demand, and no attempt was made to forecast demand for the nearby leisure complex. As a result the demand forecast was over 50% lower than observed demand – an oversight which could be critical in business case terms.

41. The analysis of trips produced by and attracted to a new station also considered the "concentration" of demand. Demand to and from a subset of the stations were analysed and it was found that for most stations 80% of demand produced by the station was focused on only three destinations, whereas trips attracted to the new station were considerably more evenly spread between origins, with the Top 3 flows only accounting for about 60% of demand. However, this should not be used as a "rule of thumb".

42. The analysis underlines the need for demand forecasters to consider the range of destinations and origins of trips from and to the new station, and to ensure that the scope of the forecasting model (including trip rate models which use journey time or frequency variables) adequately reflects these.

Review of Trip Rate Modelling and Impact of Explanatory Variables

43. In its simplest incarnation trip rate modelling simply forecasts rail demand as a function of population in the station catchment area (usually defined as within 800m of the station). However, as found in Phase 1 of this study, the instances of applying this simple approach are few, and there is no consistency in the parameters applied to the population to derive rail demand.

44. More frequently the trip rate model incorporates a number of variables in the equation and often refines the population measure either by adjusting the catchment area for local (competing) stations or for the socio-demographic characteristics of the population. As a result the parameters applied to the explanatory variables vary significantly between studies. For example, as one would expect, the parameter value applied to "population" in a methodology which forecast demand solely as a function of population is very different to one forecast demand as a function of both "population" and "train frequency". This has meant that no sensible comparison of trips rates could be prepared for the New Stations study.

45. Our independent investigation into how trip rates vary as explanatory variables are added to the forecasting methodology confirms what the review of new station forecasts showed. However comparison and benchmarking of trip rates (possibly resulting in recommendations) could be undertaken if a review were undertaken of a large number of stations (not just "new" stations) which considered a consistent approach to defining catchments and set of explanatory variables.

46. It is recommended that promoters are encouraged to carefully define the catchment area for the new station and also the drivers of demand for the station. The approach used to define the market for the new station should be documented in any submission and the demand forecasting methodology and input assumptions should reflect this market definition. The original source of any parameters used should be clearly specified, together with specific examples of where they have been previously successfully used. The New Stations Demand Forecasting Checklist, developed as part of this study, highlights the need to develop and document this understanding.

Effectiveness of a Generic Station Catchment Model in Forecasting Demand

47. Our analysis has shown that, to varying degrees, all stations have different characteristics, such that a simple single forecasting model is unlikely to be successful in accurately forecasting demand for all stations. Nevertheless, the generic station catchment based model we tested on seven different stations was shown to be able to reasonably accurately forecast demand for one of the most common types of station, that is stations with substantial residential / producer demand.

48. The station catchment methodology took into account:

- The presence of existing stations which may compete for demand with the new station
- The quality of the rail service at existing and new stations (based on GJTs)
- The accessibility (by car) of existing and new stations, including availability of car parking
- The characteristics of the population living within the catchment area
- The spatial distribution of the population within the catchment area

Whilst this methodology did not consider all factors which would affect the demand for stations (e.g. the competition from other modes), it provides an indication of the possible performance of a model which addresses some of the factors.

49. The model was used to forecast demand for 3 "stand-alone" new stations serving residential areas and for these, the model forecasts were within +/- 6% of the actual. It was also used to forecast demand for 3 stations on a new line and in this case, the forecast was within 21% of the actual. The final case was for a station serving a business park, and here the model (which is designed to forecast producer demand) seriously under-estimated demand and was not felt to be appropriate.

50. Overall, for stations of the type the model is designed for, it is felt that it is able to forecast the trips produced by new stations sufficiently accurately if the work was intended for outline business case purposes. However, further work would be beneficial to refine the parameters used, provide a means of verifying the forecasts, and enable forecasts to be made for other types of station.

Preparation of a Guidance Document on Demand Forecasting For New Stations

51. The extensive review of demand forecasts prepared for new stations has highlighted the need for a guidance document to be made available to promoters to improve the quality of demand forecasts and to improve the consistency of presentation of this information in order to facilitate funding decisions.

52. A "New Stations Demand Forecasting Checklist" has been prepared as part of this study. The checklist outlines the types of issues which the promoter (and their consultants) would be expected to consider, the key subject areas being:

- Understanding the markets served by the new station
- The rail service that will be provided at the station and ease of access to the station
- Selection and documentation of appropriate demand forecasting methodology and key assumptions
- Form and presentation of demand forecasts (to allow consistent and accurate comparison between new station proposals)
- Identification of risks that would impact on the demand forecasts

The checklist is does not provide advice on the methodologies to be used and the parameters to adopt

53. One of the main reasons for the lack of an industry recommended approach to demand forecasts for different types of station is the lack of primary research on passengers who use new stations, in particular their reasons for using the new station, their previous mode of travel (if they previously made the journey) and their home location. If more such information were available it would contribute to a better understanding of rail demand at new stations and therefore improved forecasting of demand for new stations. The guidance therefore includes a proposed list of survey questions (for both station users and non-users) which would elicit information of the type that would improve station demand modelling.

1 Introduction

1.1 Steer Davies Gleave was commissioned by Department of Transport and Transport Scotland to undertake a study to investigate whether the demand for newly opened rail stations and lines is in excess of what is forecast, and if so, the reasons for this.

1.2 The perception that station usage at newly opened stations has been in excess of what has been forecast is anecdotal and is based upon individual station examples. The study was therefore commissioned to consider a range of newly opened stations and to compare actual station usage data with forecasted demand figures.

1.3 Additionally, the findings of the study are intended to contribute to a guidance document for the promoters of new stations being prepared by the Department for Transport. The focus of this guidance document is to explain in broad terms the relevant stages in developing a business case for a new station. The guidance will not provide a definitive view on how to carry out demand forecasts for new stations.

1.4 The objectives of the New Stations study are to:

- Consider, based on a range of stations, whether demand at newly opened rail stations is consistently higher than forecast
- Consider the reasons for the discrepancy between forecast and actual demand
- Ensure that there are no systematic failures within the forecasting methodology
- Provide some guidance in demand forecasting for new stations.

1.5 The study comprises two phases, each of a couple of months duration. The first phase comprised the collation of demand forecasts and supporting documentation and the review of forecasting methodologies adopted. A comparison of forecast demand and observed demand would then identify whether demand was consistently under-forecast, and whether there was an obvious explanation for this – in particular by type of station or forecasting methodology employed. An assessment of whether there was evidence of demand being abstracted by new stations would also be undertaken.

1.6 The focus of Phase 2 of the study was to examine the reasons for the discrepancies between actual and forecast demand. The original scope of work for Phase 2 included backcasting demand for 4-6 stations using updated data inputs. However as only two of the original forecasting models were available, the scope of work was expanded to cover a greater range of issues. The core elements of work comprising the revised Phase 2 of the study comprised:

- Backcasting demand forecasts for two stations
- Producer-Attractor Analysis: Analysis of relative size of trips produced by and attracted to new stations and the concentration of demand on flows

- Further analysis of evidence of demand abstraction, reviewing trends in 4-weekly (periodic) passenger demand (rather than annual demand considered in Phase 1)
- A review of the impact on trip rates of including relevant variables in the forecasting, to illustrate why the benchmarking of trip rate models is not straightforward
- Testing the performance of a generic forecasting methodology to forecast demand for seven different stations,
- Preparation of example questionnaires which could be used by promoters to contribute to the development of robust demand forecasts and to review the performance of the forecasts (post opening). A "New Station Forecasting Checklist" would also be collated for inclusion in the DfT guidance to promoters.

1.7 This report describes the analysis undertaken for both Phase 1 and Phase 2 of the study. It shows how the forecasts of demand for new stations have compared with actual demand and recommends ways in which the quality of demand forecasts submitted to the DfT and TS could be improved and facilitate the assessment of these forecast.

2 Collation of Forecasts and Categorisation of Stations

Introduction

2.1 The remit for the study was to consider the forecasts for those stations which have opened since rail privatisation in 1999. This represents a total of 40 stations, of which 13 are on four new lines, namely the Ebbw Valley Line, Larkhall – Milngavie, Edinburgh Crossrail (southern section) and the Vale of Glamorgan line.

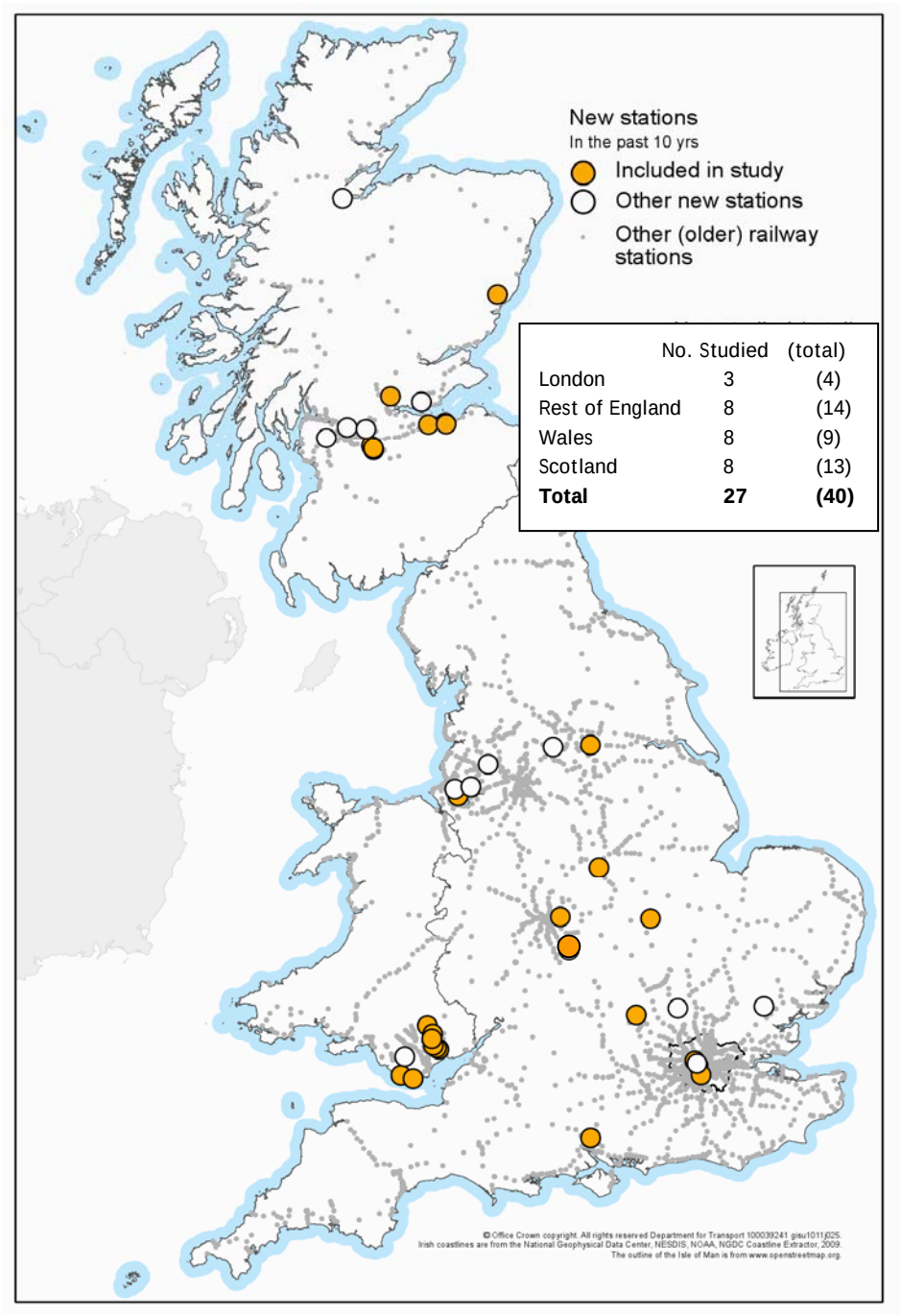
2.2 In geographical terms the new stations were widely spread throughout the UK, although there were relatively few in the North East and in Greater London. Figure 2.1 provides the full list of stations considered for review in this study.

FIGURE 2.1 STATIONS OPENED SINCE 1999

New Station	New Line?	Government Office Region	Opening Date
Alloa		Scotland	19.05.2008
Aylesbury Vale Parkway		South East	14.12.2008
Beauly		Scotland	15.04.2002
Braintree Freeport		East	08.11.1999
Brighouse		Yorkshire And The Humber	29.05.2000
Brunstane	Edinburgh Crossrail	Scotland	02.06.2002
Chandlers Ford		South East	12.12.2004
Chatelherault	Larkhall - Milgavie	Scotland	11.12.2005
Coleshill Parkway		West Midlands	19.08.2007
Corby		East Midlands	23.02.2009
Crosskeys	Ebbw Valley Line	Wales - Cymru	07.06.2008
Dunfermline Queen Margaret		Scotland	25.01.2000
East Midlands Airport Parkway		East Midlands	26.01.2009
Ebbw Vale Parkway		Wales - Cymru	06.02.2008
Edinburgh Park		Scotland	08.12.2003
Gartcosh		Scotland	09.05.2005
Glasshoughton		Yorkshire And The Humber	12.12.2004
Horwich Parkway		North West	30.05.1999
Howwood		Scotland	12.03.2001
Imperial Wharf		London	28.09.2009
Kelvindale		Scotland	26.09.2005
Lanhilleth	Ebbw Valley Line	Wales - Cymru	27.04.2008
Larkhall	Larkhall - Milgavie	Scotland	11.12.2005
Laurencekirk		Scotland	18.05.2009
Lea Green		North West	17.09.2000
Liverpool South Parkway		North West	11.06.2006
Llanharan		Wales - Cymru	09.12.2007
Llantwit Major	Vale of Glamorgan	Wales - Cymru	10.06.2005
Luton Airport Parkway		East	21.11.1999
Merryton	Larkhall - Milgavie	Scotland	11.12.2005
Mitcham Eastfields		London	02.06.2008
Newbridge	Ebbw Valley Line	Wales - Cymru	06.02.2008
Newcraighall	Edinburgh Crossrail	Scotland	02.06.2002
Rhoose - CIP	Vale of Glamorgan	Wales - Cymru	10.06.2005
Risca and Pontyminster	Ebbw Valley Line	Wales - Cymru	06.02.2008
Rogerstone	Ebbw Valley Line	Wales - Cymru	06.02.2008
Shepherds Bush		London	29.09.2008
Warwick Parkway		West Midlands	08.10.2000
Wavertree Technology Park		North West	13.08.2000
West Brompton		London	30.05.1999

2.3 Figure 2.2 shows the location of the new stations, with orange markers showing those stations for which information on the demand forecasts was available and therefore could be included in the New Stations study.

FIGURE 2.2 LOCATION OF NEW STATIONS



Data Collation

2.4 The first stage of the study was to collate the demand forecasts and supporting documentation for the new stations to understand whether demand for new stations is consistently under-forecast and if so, why. Much of this information was known to reside with Department for Transport and Transport Scotland and a

search of the archives produced a considerable volume of information. In addition, Steer Davies Gleave had undertaken the original demand forecasts for a number of stations and provided this information for the study.

2.5 Technological changes and organisational re-structuring hindered the availability of information for a number of stations however business cases or demand documentation was provided for 27 new stations, together with four demand forecasting models.

2.6 Whilst documentation was fairly comprehensive for some of the stations, for others the supporting documentation was very brief. However the information received was sufficient to provide the forecasts of demand for all the stations considered which could then be compared with observed demand to answer the question as to whether demand was consistently under-forecast.

2.7 Figure 2.3 lists those stations for which information was available (and which therefore form the basis of most of the analysis for this study) and identifies which of these are on new lines and. The table also includes the opening date of each station.

FIGURE 2.3 STATIONS FOR WHICH DEMAND FORECASTS AND DOCUMENTATION WERE AVAILABLE

New Station	New Line?	Government Office Region	Opening Date
Alloa		Scotland	19.05.2008
Aylesbury Vale Parkway		South East	14.12.2008
Brunstane	Edinburgh Crossrail	Scotland	02.06.2002
Chandlers Ford		South East	12.12.2004
Chatelherault	Larkhall - Milgavie	Scotland	11.12.2005
Coleshill Parkway		West Midlands	19.08.2007
Corby		East Midlands	23.02.2009
Crosskeys	Ebbw Valley Line	Wales - Cymru	07.06.2008
East Midlands Airport Parkway		East Midlands	26.01.2009
Ebbw Vale Parkway		Wales - Cymru	06.02.2008
Edinburgh Park		Scotland	08.12.2003
Glasshoughton		Yorkshire And The Humber	12.12.2004
Imperial Wharf		London	28.09.2009
Lanhilleth	Ebbw Valley Line	Wales - Cymru	27.04.2008
Larkhall	Larkhall - Milgavie	Scotland	11.12.2005
Laurencekirk		Scotland	18.05.2009
Liverpool South Parkway		North West	11.06.2006
Llantwit Major	Vale of Glamorgan	Wales - Cymru	10.06.2005
Merryton	Larkhall - Milgavie	Scotland	11.12.2005
Mitcham Eastfields		London	02.06.2008
Newbridge	Ebbw Valley Line	Wales - Cymru	06.02.2008
Newcraighall	Edinburgh Crossrail	Scotland	02.06.2002
Rhoose - CIP	Vale of Glamorgan	Wales - Cymru	10.06.2005
Risca and Pontyminster	Ebbw Valley Line	Wales - Cymru	06.02.2008
Rogerstone	Ebbw Valley Line	Wales - Cymru	06.02.2008
Shepherds Bush		London	29.09.2008
Warwick Parkway		West Midlands	08.10.2000

Recommendations

2.8 It is recommended that in future it is a requirement of any station signed off that full business case and demand forecasting documentation and models are provided to the DfT or Transport Scotland. Even if the new stations are signed-off under different funding schemes or commercial negotiations (such as re-franchising), full documentation should be obtained and duplicate copies stored in a single clearly defined location.

2.9 Promoters should also ensure they retain electronic copies of this information and can guarantee to make it available for ten years after the station opens.

Station Categorisation

2.10 In order to prepare robust demand forecasts it is critical that the forecasting approach reflects the type of demand which is expected to use the station. For example, if the station is being developed as a Park and Ride station, it is unlikely that demand forecasts would be accurate if they were prepared using a trip rate methodology based on the local housing stock.

2.11 The review of forecasts sought to identify whether there was any pattern in under- or over- forecasting of demand and the categorisation of stations (for example, whether demand for Park and Ride stations was consistently under-forecast).

2.12 Prior to commencing the review of demand forecasts for each station, the stations were categorised by the DfT according to the intended market served. Three main categories of station were defined:

- Residential
- Park and Ride and
- Destination

2.13 These were then refined further with residential stations in London and the South East being differentiated from those in the rest of the UK. Destination stations were sub-divided into stations serving airports or work/leisure opportunities. Park and Ride stations were subdivided into long distance inter-urban parkways and park and ride stations.

2.14 The majority of new stations are intended to serve the population of the local area and any employment opportunities in the catchment. It is usually the case that it is the forecast trips made by the local population which is the prime market for the station.

2.15 However in recent years the planning agenda, driven in part by environmental objectives, has required all types of new developments (both housing and commercial) to develop public transport services sufficiently attractive to deliver a significant public transport mode share. Stations opened at Braintree Freeport, Glasshoughton and Edinburgh Park provide access to the significant shopping and leisure opportunities nearby. Other examples are Rhoose, Luton Airport Parkway, East Midlands Parkway and Liverpool South Parkway where the stations offer rail access to regional airports.

2.16 A number of recently opened stations (usually located on the major road network) provide access to the rail network for a significantly larger than average catchment area. Passengers using long distance interurban Parkway stations (such as East Midlands Airport Parkway and Warwick Parkway) may live in conurbations which have their own station, but many live in places not served by the rail network. For the former the Parkway station offers a more attractive journey time than the local station. For the latter the Parkway station provides a realistic access point to the rail network (with the stations having large car parks with sufficient capacity for station users).

2.17 Park and Ride stations are designed to improve access to key cities, with people making the majority of the journey by car, but then transferring to rail on the edge of the city in order to avoid road congestion, car parking charges and constraints on car park capacity. Examples of such stations include Coleshill Parkway (for access to Birmingham) and Newcraighall (for access to Edinburgh).

2.18 Figure 2.4 shows the categorisation of stations. To provide an overview of the full range of stations which have opened, and to set the context of stations reviewed in this study, Table 2.4 includes all new stations. This shows that the majority of stations fall into more than one category (in other words, they serve more than one role), and therefore one would expect that the approach used to forecast demand for these stations will use more than one methodology. Of the 40 new stations opened only 17 reside within only one category:

- 10 are entirely "residential"
- 5 are "residential and destination"
- 2 are entirely "PnR"

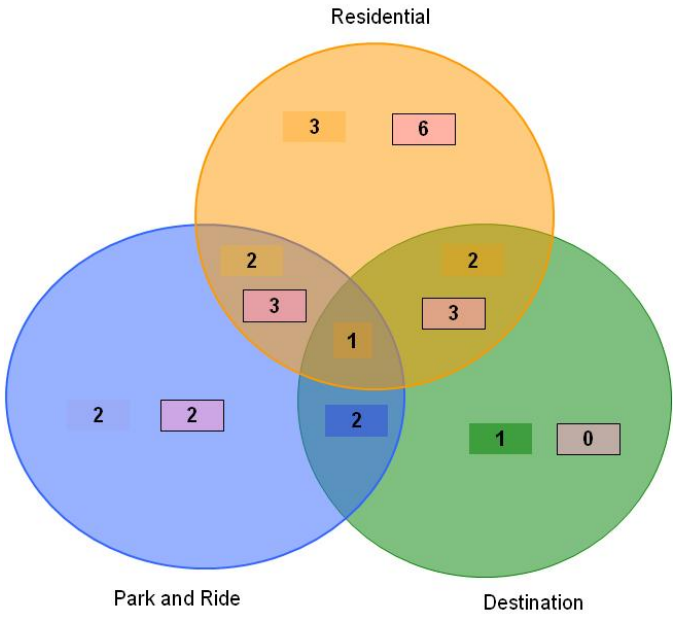
2.19 Following the reviews of the stations it was noted that the categorisation of Glasshoughton and Llanhilleth is not strictly accurate. Glasshoughton has a major shopping and leisure development nearby (and could therefore be categorised as a Residential and a Destination station), whilst Llanhilleth is probably only a Residential station (as there is no know attractor in the immediate area). Similarly, following the presentation of the analysis, Transport Scotland have confirmed that Merryton and Chatelherault (on the Larkhall branch) are not Park and Ride stations, with both having small car parks. However, since later analysis finds no link between model forecasting performance and categorisation of station, these changes do not affect any conclusions of this study.

FIGURE 2.4 CATEGORISATION OF NEW STATIONS

New Station	Residential		Park and Ride		Destination stations		
	London & SE	Other residential	Long Distance inter-urban parkway	Park and Ride	Airport	Work / Leisure	Part of a New Line
Alloa		✓		✓		✓	✓
Aylesbury Vale Parkway	✓			✓			
Beauly		✓					
Braintree Freeport	✓					✓	
Brighouse		✓					
Brunstane		✓					✓
Chandlers Ford	✓						
Chatelherault		✓		✓			✓
Coleshill Parkway				✓			
Corby		✓				✓	✓
Crosskeys		✓					✓
Dunfermline Queen Margaret		✓					
East Midlands Airport Parkway			✓		✓		
Ebbw Vale Parkway				✓			✓
Edinburgh Park						✓	
Gartcosh		✓		✓			
Glasshoughton		✓					
Horwich Parkway				✓		✓	
Howwood		✓					
Imperial Wharf	✓					✓	
Kelvindale		✓					
Lanhilleth		✓			✓		✓
Larkhall		✓		✓			✓
Laurencekirk		✓		✓			
Lea Green		✓					
Liverpool South Parkway				✓	✓		
Llanharan		✓					
Llantwit Major		✓					✓
Luton Airport Parkway	✓			✓	✓		
Merryton		✓		✓			✓
Mitcham Eastfields	✓						
Newbridge		✓					✓
Newcraighall				✓			✓
Rhoose - CIP		✓			✓		✓
Risca and Pontyminster		✓					✓
Rogerstone		✓					✓
Shepherds Bush	✓					✓	
Warwick Parkway			✓				
Wavertree Technology Park		✓				✓	
West Brompton	✓					✓	

2.20 Figure 2.5 shows the categorisation of stations for which demand forecasts and supporting documentation was available. The numbers in pink boxes represent stations which are also on a new line, for example there are 3 stations which are residential and destination stations AND are on a new line. This underlines that fact that most stations have multiple roles, implying that more than one forecasting "model" will need to be employed.

FIGURE 2.5 CATEGORISATION OF NEW STATIONS FOR WHICH DEMAND FORECASTS ARE AVAILABLE



2.21 Whilst demand forecasting information was available for 27 of the new stations, 12 of these were on new lines, and this limited the investigation of whether there was a pattern in the forecasting of demand and categorisation of station. This was further constrained by the very limited supporting information available for some stations. For example, the only information available for Newcraighall (a Park and Ride station) and Brunstane (a residential station) was the review of the bid for RPP funding for the Edinburgh Crossrail line, which did not specify whether demand forecasts for the two stations had been prepared using different methodologies.

Conclusions and Recommendations

2.22 Independently categorising new stations according to their role (the types and journey purpose of passengers who will use them) is extremely valuable when reviewing proposals for new stations. It focuses attention on the type of forecasting methodology one would expect to have been used and allows comparison with business cases for other stations and existing stations. In terms of developing guidance for the forecasting of demand for new stations it is a key component of the approach that would be proposed.

3 Review of Demand Forecasts for New Stations

Introduction

3.1 The review of the demand forecasts for the new stations was undertaken and documented using a template format. Whilst some of the forecasting documents were succinct in their description of the forecasting methodology and presentation of the forecasts, others were considerably more detailed, and included a number of iterations of forecasts. In other instances the supporting documentation for the forecasts was sparse, which limited the review and commentary.

3.2 The review of the demand forecasts and supporting documentation was the main component of Phase 1 of the study. It was first necessary to gain an understanding of the station as it was delivered, in terms of the markets served and the train service offered. The demand forecasting methodology then needed to be understood and key assumptions identified and documented.

3.3 In parallel "actual demand" at each station was obtained for comparison with the demand forecasts. The actual demand data was obtained from the demand matrix prepared for the MOIRA Replacement project, which uses LENNON passenger journeys data as its source. As a cross-check the passenger demand data for a number of the stations was compared with passenger journeys information published by the Office of Rail Regulation and was found to be consistent.

Structure of Framework Comparison Table

3.4 Prior to commencing the review of the documentation for the new stations, a framework was developed which would allow the information and forecasts to be reviewed in a consistent manner. The Framework Comparison Table (FCT) comprised four main sections:

- Description of the station including the opening date, promoter and categorisation of station. The level of service actually provided at the station and that assumed in the demand forecasts
- Review of demand forecasting methodology
- Comparison of forecast and observed passenger demand
- Specification of neighbouring stations for use in the abstraction analysis

Description of Station

3.5 The first section of the FCT focussed on a short description of the station, including the opening date, an independent description of the station, the categorisation of the station and the name of the promoter(s) of the station. Whilst the business case documents usually provided a description of the proposed station and the markets it would serve (and benefits it would deliver to the local community) it was considered important to provide an "independent" description using information from a consistent source for all stations which would not reflect the favourable spin on proposals that applications for funding tend to include.

3.6 The accessibility of the station and the train services offered at the station was also documented and this provided a useful context to the commentary of the demand forecasting methodology and forecasts themselves. Not infrequently it was found that the actual train services provided were different from what was planned (and assumed in the forecasts).

Review of Demand Forecasting Methodology

3.7 The second section of the framework comparison table described the forecasting methodology used to forecast demand for the new station. This included the name of the organisation responsible for preparing the forecasts (and a contact name and number where available). Full references to the forecasting documents provided for our review were specified.

3.8 The review of the forecasting methodology sought to identify the approach and assumptions used to forecast:

- Total passenger demand at the new station
- Demand abstraction
- Demand build-up
- Underlying demand growth over time

Comparison of Forecast and Observed Passenger Demand

3.9 The demand forecasts for the station are compared with the actual demand in the third section of the framework. Whilst this comparison should be straightforward, the format in which forecasts were presented in the original documentation often required the numbers to be converted in order to facilitate a meaningful comparison with observed demand. To ensure there was some transparency in how the forecasts were converted the framework included specific reference was provided to where in the source documents forecasts and parameters were obtained in order to implement the conversion.

Specification of Neighbouring Stations

3.10 This section of the framework comparison table was used to document the choice of neighbouring stations which would be used in the analysis of potential demand abstraction, which is described in detail in Chapter 4 of this report.

Review Findings

3.11 The extent of the documentation supporting the demand forecasts varied considerably between studies. For those stations where original documentation was available the documentation ranged from a short technical note (Imperial Wharf and Shepherds Bush) to individual demand forecasting reports or substantial sections of business case reports (Ebbw Valley line). Where the only information available was the reviews prepared for the RPP funding, descriptions of the original forecasting methodology ranged from one to four pages.

3.12 The documentation was generally reviewed twice with the objective of the first review being to identify the information for headline categories, namely to:

- understand the nature of the station in question and the context in which the forecasts had been prepared,
- identify key assumptions (such as train service assumed) and issues that would affect the forecasts of demand
- identify the forecasts of demand which would be compared with actual demand.

3.13 A more detailed review of the documentation was then undertaken to understand the details of the demand forecasting methodology adopted and the parameters used. Where demand forecasts presented in the documentation were not in a comparable format to the LENNON actual demand data, information that would allow the conversion of the forecasts into annual passenger journeys for the years in which the station was open was sought and the forecasts converted accordingly. For example some of the original demand forecasts were for a single day or peak period or for a year some years away from the actual opening date.

Review of Station and Train Service Information

3.14 The extent of information provided on the station and its role was described was generally adequately covered in the original documentation. In some instances the rationale for the selection of demand forecasting methodology was explained.

3.15 The train service which was expected to operate at the new station was clearly described in many of the documents (in terms of the frequency and journey time to key stations). However in others it the train service assumed was not mentioned or not described with any clarity. Whilst the service specification may not be a fundamental input to the demand forecasting methodology used (for example trip rate modelling generally does not use train service information as an explanatory variable, whereas in mode choice models it is a critical input), it is an important element of the forecasts in terms of sense checking the demand relative to other stations and ensuring there is sufficient train capacity for the demand generated by the station.

3.16 In general the train service actually delivered when the station opened was consistent with that assumed in the demand forecasts. The two identifiable exceptions to this were stations on the Ebbw Valley Line, where forecasts assumed that a direct train service to both Cardiff and Newport would be provided, however in practice only a service to Cardiff was provided. And the forecasts for East Midlands Parkway (prepared as part of the re-franchising of East Midlands Trains) also assumed a very different service pattern and journey time to that which was actually delivered.

3.17 The extent of information regarding access to and egress from stations also varied considerably. One would expect to have information provided on:

- the frequency of bus services between the station and key population and employment locations
- station car park capacity and pricing (and a comparison with other stations and car parks in the area, including the utilisation of these car parks)
- taxi and cycle parking provision

since these are all potentially important access modes and may influence total demand for the station and the level of abstraction likely to occur. In general the extent of information provided in the original documents was limited, with car park provisions, use and pricing (for the new stations and neighbouring stations) rarely referred to.

3.18 One of the major omissions in the documentation of the forecasts was information on competing modes (for example car and bus journey times and costs). In some studies (for example those where rail demand was forecast using a mode choice model) this information is a critical input, but there was negligible information supplied.

Review of demand forecasting methodology

3.19 The critical elements of demand forecasting for new stations includes the methodology and assumption used to forecast "full single year demand" at the new station, the approach used to assess demand abstraction from existing stations and the extent to which demand will build up following the opening of the new station. Table 3.1 summarises the core demand forecasting approach used for each station, the level of supporting information provided and whether demand abstraction, demand build-up and underlying demand growth had been forecast (and if so, the level of detail of the approach).

3.20 A review of the demand forecasting methodologies used to forecast "full single year demand" at the new stations showed that the demand for many of the stations categorised as residential stations was forecast using a trip rate approach – reflecting the current PDFH guidance. However the trip rate methodology applied varied in complexity, in terms of the "explanatory variables", the parameters applied and the definition of the catchment area to which the trip rates were applied.

3.21 Furthermore it is understood that there is some anecdotal evidence that people move to be within station catchment areas to take advantage of new services, which could result in the catchment having a high propensity to use rail – making the application of trip rate models more complex.

TABLE 3.1 SUMMARY OF DEMAND FORECASTING METHODOLOGY

New Station/Line	Methodology Used	Abstraction modelled?	Exogenous growth modelled?	Extent of documentation
Alloa	No Information supplied	Unclear	Unclear	None provided
Aylesbury Vale Parkway	Trip rate and accessibility modelling (using HEXs)	Yes	Yes	Good
Chandlers Ford	Logit model, trip rate model and MOIRA	Yes	Yes	Good
Coleshill Parkway	Trip rate model and logit mode choice	Unclear	Yes	No description of demand modelling
Corby	Trip rate, MOIRA and station access model	Yes	Yes	Good
East Midlands Airport Parkway	GIS catchment analysis, elasticity based model & airport mode share assumptions	Yes	Yes	Good
Ebbw Valley Line	Logit model and uplift for trip generation	N/A	Yes	Reasonable
Edinburgh Crossrail	No Information supplied	N/A	Unclear	No description of demand modelling
Edinburgh Park	Trip rate and logit mode choice	Yes	Yes	Rather poor
Glasshoughton	Trip rate	Unclear	Yes	No description of demand modelling
Imperial Wharf	RAILPLAN strategic forecasting model	Yes	Yes	Good
Larkhall-Milngavie	4 stage land use model	Yes	Yes	Good
Laurencekirk	Trip rate	Partially	No	Reasonable
Liverpool South Parkway	Elasticity based model, airport accessibility model, mode switch (logit) model	Yes	Yes	Good
Mitcham Eastfields	Trip rate	Yes	Yes	Good
Shepherds Bush	Trip rate	Yes	Yes	Good
Vale of Glamorgan Line	Trip rate	Unclear	Yes	Poor
Warwick Parkway	Parkway Access Model and Mode/Route Choice models	Yes	Yes	Good

3.22 For example, the demand for Mitcham Eastfields was defined by the distance of the population from the station (a slightly unusual explanatory variable). The trip rates were based upon analysis of existing demand at local stations (Tooting, Streatham Common and Mitcham Junction) and the catchment area was defined as Enumeration Districts where the centre of population was closest to Mitcham Eastfields station.

3.23 For Shepherds Bush station, where a significant proportion of the demand is trips attracted to the station, demand was forecast using trip rates derived following an assessment of demand at Kensington Olympia station. Trip rate parameters were then applied to both the population and employment in the Shepherds Bush catchment.

3.24 Laurencekirk demand was forecast using a trip rate model based on the local area population and trip rates derived from TEMPRO data. However the trip rate parameter calculated using this approach was considered high and given the rural nature of the location and high levels of car ownership, the trip rate used in the final forecasts was half that which was derived from the source data.

3.25 However demand for stations on the Larkhall line (Larkhall, Merryton and Chatelherault) was forecast using the Strathclyde Integrated Transport Model (SITM) - a four stage land use models to forecast demand. This forecasting methodology was selected as the service to be provided to the new stations was part of a package of inter-related service changes in the Glasgow area. SITM was therefore used to forecast the impact on demand of all the service changes, together with the demand at the new stations.

3.26 Demand for Imperial Wharf was forecast using Railplan (another strategic forecasting model), with the selection of this forecasting approach not explained.

3.27 Demand for Chandlers Ford was forecast using a logit model, which selected three key origins and destinations (Southampton, Eastleigh and Romsey) and used generalised journey times for rail, bus and car and existing car and bus journey information. Generated demand was then added as an uplift. The forecasts were then compared with those prepared from a trip rate approach, with the two approaches showing broadly similar results.

3.28 Demand for Park and Ride stations (Liverpool South Parkway, Coleshill Parkway and Warwick Parkway) was predominantly forecast using logit mode choice models.

Demand Abstraction

3.29 The abstraction of demand from existing stations was taken into consideration in the majority of forecasts, although it was not always specifically addressed. Abstraction can take two forms:

- Passengers no longer travelling on the route as a result of increases in journey time due to the additional station stop.
- Passengers transferring from an existing station to the new station in order to access the rail network

3.30 The review of documentation suggests that where new stations result in increases in train journey times, the impact on demand is modelled. This is usually modelled using MOIRA (used for Chandlers Ford, Edinburgh Park and Laurencekirk). For Glasshoughton it was acknowledged that abstraction of this type would be an issue, but the effect was not modelled. Similarly, there was no evidence of modelling abstraction for Coleshill Parkway or Mitcham Eastfields. Where stations are on a new line, or at the extreme ends of a line (e.g. Aylesbury Vale Parkway) this type of abstraction is not an issue.

3.31 The second type of demand abstraction which may be an issue when new stations open is where people who currently travel by train using existing stations transfer to using the new station since it offers a more attractive journey. These passengers do not represent net additional rail use and should be identified in any proposal for a new station. Any business case should ensure that these new journeys are treated appropriately, with revenue forecasts reflecting only the difference in fare paid and benefits reflecting the change in journey time and any change in highway use.

3.32 Trip rate models generally considered abstraction by identifying the catchment area of the new station which over-lapped with an existing station, and took a pragmatic assumption of who would transfer to the new station. For example, demand forecasts for Shepherds Bush station assumed that one third of those living or working in the Shepherds Bush and Kensington Olympia overlapping catchment area would transfer to Shepherds Bush.

3.33 Forecasts of demand for Corby station took account of the fact that a significant proportion of the catchment area is located on the main road to Kettering by using a station access model in addition to a trip rate model. Having forecast total rail demand using the trip rate model, the choice of station (Corby or Kettering) was forecast using the station access model.

3.34 Demand forecasts generated using a strategic forecasting model, such as the SITM model for Larkhall branch (and Railplan for Imperial Wharf) are assumed to have implicitly taken account of abstraction. Such models generally model access to the rail network from zones using links with appropriate speeds assumed. Where a new station is introduced into the model one would expect that zones in the area will be provided access to the network by coding links to the new station, and the functions within the model will allocate demand according to the existing and new stations according to generalised journey times.

3.35 Demand for stations on the Ebbw Valley Line (a new line) was assumed not to be abstracted from existing stations. This view was based on the planned rail service being to Newport, the poor road connectivity to stations in other valleys and the relatively poor rail service in parallel valleys.

3.36 Documentation provided on the forecasts of demand for other new lines (Vale of Glamorgan and Edinburgh Crossrail) did not specify whether abstraction had been modelled.

Demand Build-Up

3.37 Having prepared forecasts of demand for a single year, the review confirmed that it is standard practice to apply build-up factors to the single year demand estimate

to reflect the fact that full demand would not be expected to occur from Day 1 of the service. Build-Up factors were applied to the single year forecasts to reflect the fact that it was assumed that demand would build up to the "full single year estimate" over a period of time (usually 3 years). However, for some stations (e.g. Glasshoughton) a build-up over 2 years was assumed and in other cases no build-up factors were specified.

3.38 The source of the assumed build-up factors was not specified in any study, and appeared to be fairly pragmatic assumptions. Build-up factors were generally in the following ranges:

- Year 1: 50 – 70%
- Year 2: 75 - 90%
- Year 3: 90 – 100%

3.39 These assumptions are broadly consistent with PDFH 5 (Section B12) which provides some guidance for how demand builds-up over time (referred to in the PDFH as a "lag" effect). Whilst the PDFH provides no guidance specifically for demand build-up at new stations, the advice for "major new services" (probably the most relevant to new stations) advises the following build-up assumptions:

- End Year 1: 70%
- End Year 2: 85%
- End Year 3: 95%

With all lags assumed to be complete (100% of demand evident) by the end of year 4.

3.40 For Imperial Wharf and Shepherds Bush stations, build-up factors of 35% in year 1, 75% in year 2m, 90% in year 3 and 100% in year 4 were assumed. It is understood that the source of these assumptions is the Transport for London Business Case Development Manual.

3.41 There were a number of exceptions to this approach. The first being instances where the start of service was defined as being mid-year, and in such cases the build-up factors were lower than otherwise found: presumably as they were adjusted to reflect part year operation.

3.42 A more complicated exception is that where demand forecasts were prepared using 4 stage land use models, which generally have a "base year" demand (using a demand matrix prepared using observed passenger demand) and then provide forecasts for demand at 5-year intervals (using pre-prepared demand matrices which include underlying demand growth). In these instances the demand for the first year of operation was estimated using a combination of assumptions regarding underlying growth which were applied to the single year demand forecast, and then build-up factors were subsequently applied.

3.43 One of the difficulties in assessing how accurate demand forecasts are is that for stations opened in the last three years, demand build-up is likely to be still taking place. Therefore it will not be clear whether it is the single year forecasts (and the assumptions, methodology and parameters underlying them) or the demand build-

up assumptions are producing accurate forecasts. It is likely that only in year 4 onwards (or possibly year 3 for stations serving only a predominantly local residential population) that conclusions as to the appropriateness of these two components of the forecast can be drawn.

Underlying Growth

3.44 Proposals for new stations are usually required to present a business case to show the value for money of the proposed investment. One of the key inputs to the business case is forecasts of revenue over the appraisal period. Revenue forecasts (and economic benefit forecasts, which are also a business case input) are driven by forecasts of how demand will grow over the period, and therefore forecasts of demand over a considerable period (often 30 years) is required.

3.45 These forecasts are prepared by applying assumptions of how rail demand will grow over the period as a result of changes in the economy (referred to as "underlying growth) to the full year station demand forecast. The review of the forecasts showed that fairly reasonable pragmatic assumptions were taken in most studies regarding the level of growth that would be expected. These typically ranged from between 1% - 4.5% with some studies providing different growth forecasts for peak and off-peak demand and forecasts of higher growth in the early years.

3.46 The sources of the underlying growth assumptions were specified for approximately half of the stations considered, these being:

- Liverpool South Parkway (growth is in line with Merseyrail Electrics growth)
- East Midlands Parkway and Ebbw Valley Line (TEMPRO forecasts and PDFH guidance)
- Aylesbury Vale Parkway: (growth consistent with franchise bid model, which broadly followed PDFH guidance. This was then adjusted for the forecast housing completions in the area).
- Larkhall Line (based on the "midpoint of the governments high and low forecasts for economic growth")
- Edinburgh Park (forecasts of 5.2% pa growth based on forecast growth in employment in the local area)
- Forecasts of demand for Mitcham Eastfields station were based on 1991 observed rail demand data (from LATS) which was then uplifted to 2006 using high level estimates of underlying demand growth.

3.47 One could infer that the remaining forecasts were selected based on an understanding of demand growth being experienced by other stations with similar characteristics (both in terms of geographical location and train service provided), but in our necessarily brief review of the documentation, this could not be confirmed.

3.48 If any pattern was evident in the choice of growth rates used then it was that slightly higher growth rates used in the earlier studies than the later studies,

reflecting the growth that was being experienced at the time (and which would have been expected in submissions by the funding authorities).

Comparison of forecast and observed passenger demand

3.49 Observed passenger demand information was based on LENNON passenger journeys information. This was obtained via the information being used for the MOIRA Replacement project, which had already pre-processed the data into a usable format. Using this information also offered efficiencies for future tasks as it was already available in a format which could be used for the abstraction analysis.

3.50 The forecasts of demand were then compared with observed demand and key outliers identified, as shown in Figure 3.1.

3.51 Whilst the PDFH provides some guidance of how to forecast demand for new stations, it is widely recognised that the guidance is based upon relatively little research, and could be improved upon were more evidence available. Furthermore, little primary research has been undertaken in new station studies to guide what aspects of demand are modelled when forecasting demand for new stations. Similarly, very few (if any) post implementation surveys have been commissioned to consider how demand forecasts have performed for stations which have opened (and the types of passengers who use the stations). The level of accuracy of demand forecasts for new stations was therefore expected to be poorer than other types of demand forecasts. Prior to undertaking the review of forecasts against observed demand it was expected that any forecast within +/- 20% of observed demand would represent a reasonably accurate forecast.

FIGURE 3.1 COMPARISON OF FORECAST AND OBSERVED DEMAND

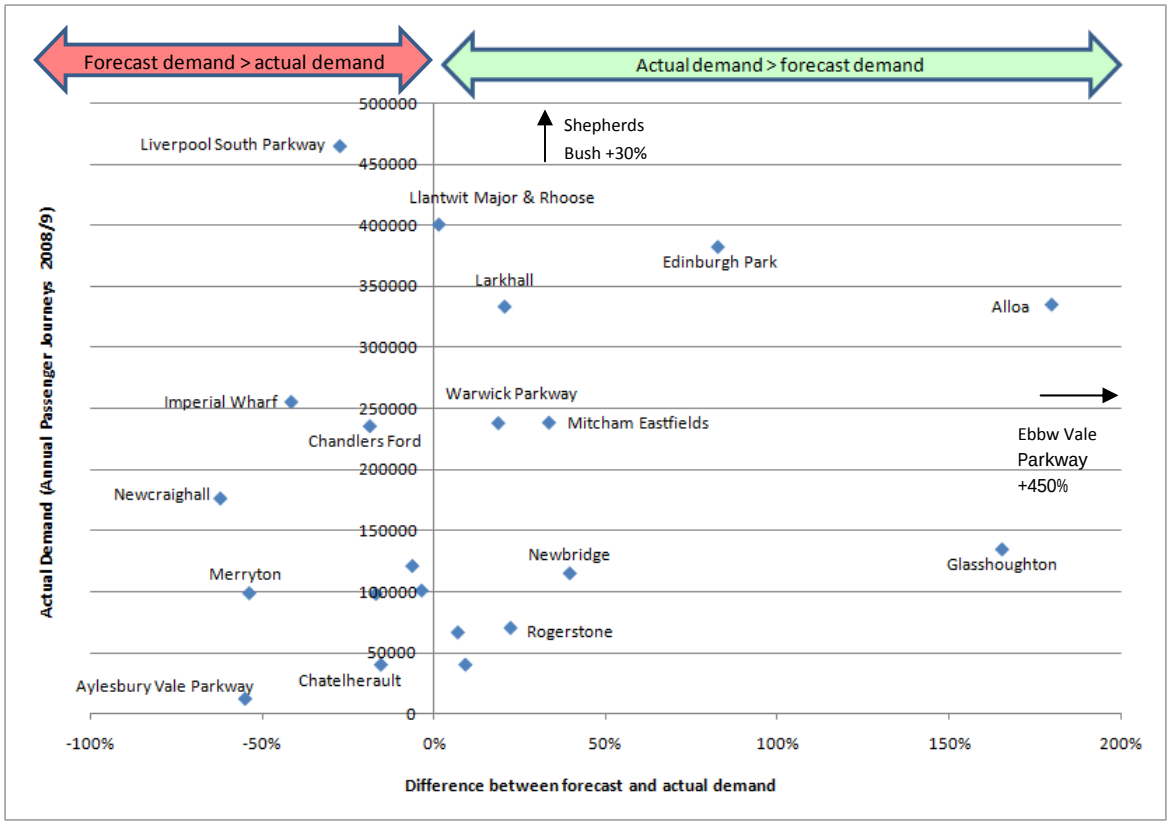


FIGURE 3.2 FORECAST AND OBSERVED DEMAND

New Station	Forecast	Actual	Difference
Aylesbury Vale Parkway	29,000	13,066	-55%
Brunstane	129,920	121,758	-6%
Newcraighall	467,600	176,975	-62%
Chandlers Ford	290,237	236,145	-19%
Ebbw Vale Parkway	45,858	252,607	451%
Crosskeys	62,982	67,347	7%
Newbridge	82,951	115,733	40%
Risca and Pontyminster	105,412	101,624	-4%
Rogerstone	58,087	71,041	22%
Llanhilleth	37,529	40,967	9%
Imperial Wharf	437,760	256,000	-42%
Liverpool South Parkway	640,652	465,324	-27%
Mitcham Eastfields	179,115	239,040	33%
Shepherds Bush	922,717	1,219,167	32%
Alloa	120,000	335,687	180%
Warwick Parkway	201,000	238,654	19%
Glasshoughton	50,989	135,279	165%
Llantwit Major & Rhoose	395,650	401,192	1%
Edinburgh Park	209,619	382,823	83%
Coleshill Parkway	119,000	98,903	-17%
Larkhall	276,993	334,015	21%
Chatelherault	48,399	40,922	-15%
Merryton	215,191	99,500	-54%

3.52 The results of the comparison of observed and forecast demand shows that a significant proportion of forecasts are within 20% of observed demand, and there is no obvious tendency to over-forecasting or under-forecasting.

3.53 The station with the greatest different between forecast and actual demand is Ebbw Vale Parkway, where the actual demand in 2008/9 was 252,000 passenger journeys compared to 46,000 forecast. The methodology used to forecast demand was a logit model (based on road side interviews and generalised journey times) together with an uplift applied to reflect trip generation. Two of the reasons for the under-forecast of demand have been identified as:

- The exclusion (as requested by the Strategic Rail Authority) of rail demand arising from regeneration of the area and also the assumption that the local steelworks would remain open and
- The fact that the rail service operates to Cardiff, rather than Newport (as assumed in the modelling)

3.54 The different destination station of the line (Cardiff as opposed to Newport) had a particularly significant impact as the forecasting methodology did not survey road traffic on the Heads of Valleys road (which provides a good road link from Ebbw Vale to Cardiff), and therefore a key potential market was omitted from the forecasts. Whilst demand was significantly under-forecast for Ebbw Vale Parkway, the same methodology was used to produce reasonably accurate forecasts for the

other five stations (Llanhilleth, Newbridge, Crosskeys, Risca and Pontyminster and Rogerstone) on the Ebbw Valley Line.

3.55 The other most significant outlier in Figure 3.1 is Shepherds Bush station, however some caution should be observed for this example. The only "actual demand" information available is from a one-day passenger count in November 2009, when 3,500 passengers were found to use the station. However demand forecasts for the station were only prepared for the peak period (without specifying am or pm peak), and the forecasts were converted into a daily forecast by SDG using high level assumptions. It is recommended that further observed demand data is obtained (which should also be split by time of day) before any conclusions as to the forecasting performance of the model are drawn.

3.56 The original demand forecasts for Alloa were only high level estimates as the station was delivered as part of the enhanced freight network - allowing freight services to operate via Alloa to provide capacity relief for on the Firth of Forth route. Forecasts of passenger demand at Alloa were therefore not a fundamental aspect of the business case for the scheme. It is understood that much of the demand at Alloa is accounted for by mode switch from bus - it is not clear whether the high level estimates considered the potential for mode switch (or understood the size of the bus market).

3.57 Whilst the documentation of the forecasts for Glasshoughton station recognised that it would be a destination station (serving the local leisure opportunities), the report specifically stated that no attempt had been made to estimate the demand from this source. The New Stations study has found that c50% of demand for Glasshoughton is attracted to the station, which would explain a significant element of the under-forecast.

3.58 Insufficient information was provided on the forecasting methodology for Edinburgh Park to comment on the likely reason for the under-forecast. However it should be noted that this is the only station which is categorised as "Destination" alone. Transport Scotland have advised that employment in the area has been slower to develop than expected, so this does not explain the result. However it is possible that the forecasts did not take into account demand abstracted from other stations such as South Gyle.

3.59 The explanation of the over-estimate of demand for Aylesbury Vale Parkway is due to the fact that the significant planned housing development nearby was halted in the recession. This is further tested in the backcasting analysis in Chapter 5.

3.60 Demand for Liverpool South Parkway was also significantly over-forecast, with the reason for this thought to be due to the different rail service pattern that was delivered compared to what was assumed in the forecasts. Furthermore, the frequency of the bus link from the station to Liverpool John Lennon airport was significantly less frequent than had been assumed. Again, these issues are considered in the backcasting exercise described in Chapter 5.

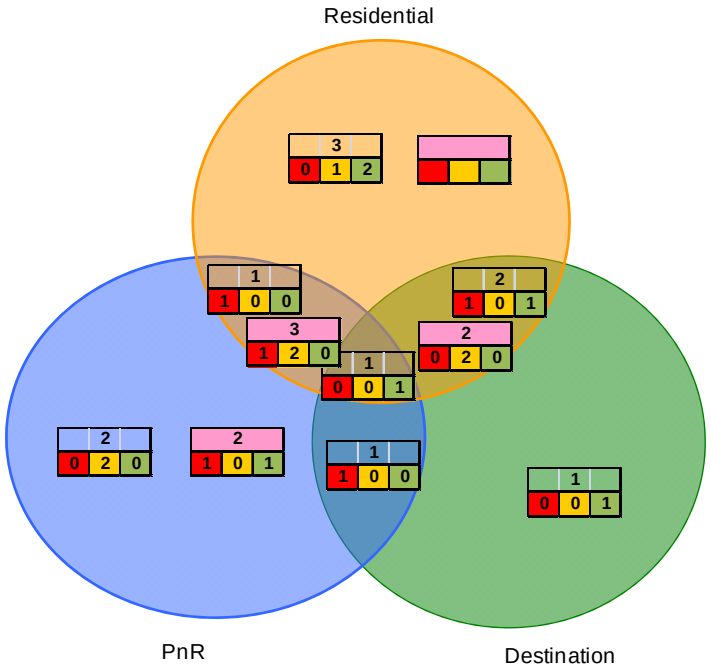
3.61 A strategic transport model (RAILPLAN) was used to forecast the demand for Imperial Wharf station. It is not know how the model was modified to include the new station (in terms of which zones were attached to the station) and the access times assumed. Nor is it clear whether the validation of demand at existing local

stations was considered before updating the model to include Imperial Wharf. These may all be reasons for the relatively poor accuracy of the forecast. In general strategic forecasting models are not able to reflect the local characteristics sufficiently to forecast demand for new stations.

3.62 The reason for Merryton forecasts being considerably higher than actual is not fully understood – as its two neighbouring stations on the Larkhall line were reasonably accurately forecast using a four-stage land use model (despite this modelling approach not conventionally thought to be appropriate for individual station forecasts). Transport Scotland have indicated that one reason may be that the reason may be that demand has been suppressed due to the fairly small car park at the station (with c30spaces).

3.63 Demand was significantly over-forecast for Newcraighall, which is a Park and Ride station on the new Edinburgh Crossrail line. No information was supplied on the methodology used to forecast demand, so it is not clear whether the reason for over-forecasting is due to the methodology used. However, whilst the station was designed as a Park and Ride station, it has an infrequent train service and there is little incentive for Park and Ride as congestion along routes to the City is not a problem. It is possible therefore that the forecasting methodology did not take these issues into account. Furthermore it is understood that initially there were significant reliability problems with the service which would have detracted from its use as a Park and Ride station.

FIGURE 3.3 COMPARISON OF FORECAST AND OBSERVED DEMAND BY STATION CATEGORY



3.64 Figure 3.1 shows the comparison of forecast and actual demand according to the station category. This shows that there is no evidence that the over or under-forecasting of demand is related to the type of station. It should be noted that

three stations (Corby, Laurencekirk and East Midlands Parkway) are excluded from this analysis as observed demand was not available for these stations. Forecasts for the two stations on the Vale of Glamorgan Line (Rhoose and Llantwit Major) were not available individually and therefore for this analysis they are included as a Residential/destination station on a new line (Rhoose station serves Cardiff International Airport).

Conclusions and Recommendations

3.65 Demand forecasting reports should also include a description the station and the train services provided at the station. The train service description should include the frequency of services and the key stations served on the route. The description of the station should include the key markets that will be served by the station and (the accessibility of the station (e.g. car park size and buses serving the station) as these are key to both understanding and reviewing demand forecasts. Our review showed that there was considerable variation in the level of detail provided in the original documentation.

3.66 The review of demand forecasting methodologies highlighted the need for forecasting reports to provide thorough explanations of the rationale for the selection of the methodology used to forecast demand. A description of the source of any parameter values (e.g .trip rates and mode specific constants) used in the forecasting should also be provided, in sufficient detail for readers to understand the robustness of the values and any risks to the forecasts.

3.67 Many forecasting methodologies implicitly include an assessment of demand abstraction from local stations but on many occasions it was not mentioned in the supporting documentation. Forecasters should describe those stations which may be affected by abstraction and explain how the proposed methodology adequately models abstraction.

3.68 There was broad consistency across studies in the level of demand build-up that was assumed for the new stations, however the source of the assumed build-up rates was rarely stated (although comparison with PDFH guidance for build-up for major new services showed similarities). We would recommend that a review of LENNON data is undertaken (including 2009/10 and 2010/11 data) to see how actual demand for new stations has built-up. The findings should then be made available to the industry.

3.69 Our review showed that growth in demand for new stations that arises from the growth in the economy is usually included in forecasts. The source of these underlying growth rates is often standard industry techniques (e.g. PDFH) but in other instances appears to be based on pragmatic assumptions (with the resulting growth not dis-similar from those based on a more technical footing). It is recommended that where strategic forecasting models are used to forecast demand for new stations, more effort should be made in relating the forecasts for (typically) 5 year intervals to the planned opening year and the years thereafter, also taking into account build-up.

3.70 The comparison of forecast and observed demand showed that there is no systematic under or over-forecasting of demand for new stations, Given the relatively poor evidence base and published forecasting guidance, forecasts of

demand could be considered quite accurate. There are, however, a number of stations for which forecasts are significantly different to actual demand. The reasons for this include:

- outturn values for input assumptions being significantly different to that which had been assumed (e.g. Aylesbury Vale Parkway, Liverpool South Parkway and Ebbw Vale Parkway)
- key factors which will affect demand not being modelled (Glasshoughton),
- models being used which were unlikely to be able to reflect local characteristics and
- guidance from funding authorities to exclude certain generators of demand (e.g. exclusion of demand arising from regeneration of an area).

3.71 For a number of stations (Alloa, Edinburgh Park and Newcraighall) there was insufficient information available on how the forecasts had been prepared, and the reason for the under or over-forecast could only be surmised.

4 Investigation of Potential Demand Abstraction

Introduction

4.1 When preparing forecasts of demand for new stations one of the key issues is the extent to which demand may be abstracted from other stations. Our review of forecasts showed that abstraction is usually "implicitly" accounted for in forecasts. However there has been little or no research into actual abstraction which hampers attempts to forecast it. The new stations study provided an opportunity to undertake a desk-based investigation into evidence of abstracted demand.

4.2 The source of demand for new stations generally comes from three sources: mode switch (generally from car to rail), trip generation (demand where previously these trips were not made) and abstraction (trips previously made via an existing station switch to using the new station). The contribution of each of these sources to total demand at the new station varies considerably.

4.3 The extent to which demand at the new station is formed of people who previously travelled by rail but from an existing station is a key issue. This demand does not represent "new" demand to the rail network

4.4 Research by Blainey and Preston, University of Southampton "Assessing the potential performance of new local railway stations" (Association for European Transport and contributors 2009) sought to identify evidence of demand abstraction by comparing trends in annual demand growth at neighbouring stations. However the study concluded that "*while abstraction of passengers from existing stations may have occurred in some cases, it was far from a universal phenomenon".*

4.5 Both Phase 1 and Phase 2 of our study considered whether there was evidence of demand abstraction. The approach used for the investigation in Phase 1 was broadly consistent with that formulated by Blainey and Preston, looking at trends in annual demand for the neighbouring stations for all 40 new stations. A similar approach was used in Phase 2 however trends in demand over 4-weekly periods (rather than annual demand) was reviewed.

Methodology

4.6 The methodology used by Blainey and Preston to identify evidence of demand abstraction compared the growth in demand in the year preceding the new station opening with the growth in demand the year after opening. The growth rates for two types of station were compared:

- Adjacent stations (those which might be used by the population of new station catchment area prior to the opening of the new station)
- Non-adjacent stations (those which would be unlikely to be used by the new station catchment population)

4.7 The first task in our research into abstraction was to identify adjacent stations from where demand might be abstracted. Whilst Blainey and Preston identified

between 3 and 8 adjacent stations for each of their 10 new stations we focussed our analysis more tightly using our understanding of the train services in the corridor (and parallel corridors) – in terms of the markets they served and the train services at each. As a consequence we generally only identified fewer than four "potential abstraction stations" for each station, often these were adjacent stations. This analysis also enabled us to identify "counter-factual stations": those in the same corridor or adjacent corridor, with similar levels of service, but from which demand was unlikely to be abstracted. Figure 4.1 shows the key "potential abstraction" and "counterfactual" stations for all stations. Potential abstraction stations are presented in two separate columns. The stations in first column are those which are on the same corridor as the new station. Those stations in the second column are located on other corridors – usually those parallel to that serving the new station.

FIGURE 4.1 NOMINATED "POTENTIAL ABSTRACTION" AND "COUNTER-FACTUAL" STATIONS

New Station	Potential stations where abstraction may occur		Counterfactual stations
Aylesbury Vale Parkway	Aylesbury	Bicester	Stoke Mandeville, Wendover
Brunstane	None	Musselburgh	N/A
Newcraighall	None	Musselburgh	N/A
Chandlers Ford	Eastleigh, Romsey		Shawford, Dunbridge, Swaythling
Corby	Kettering	Peterborough	Market Harborough, Wellingborough
Ebbw Vale Parkway	None (new line)	Abergavenny, Rhymney	Tir-phil, Brithdir, Bargoed, *Cwmbran*
Crosskeys	None (new line)		N/A
Newbridge	None (new line)	Hengoed, Ystrad Mynach, Pontypool & New Inn	
Risca and Pontyminster	None (new line)		N/A
Rogerstone	None (new line)		N/A
Llanhilleth	None (new line)	Pontypool	Cwmbran
Imperial Wharf	West Brompton		Kensington Olympia, Wandsworth Town
Liverpool South Parkway	Hunts Cross, Cressington, West Allerton		Aigburth, Hough Green
Mitcham Eastfields	Mitcham Jn, Streatham	Tooting	Hackbridge, Carshalton
Shepherds Bush	Kensington Olympia		West Brompton
Alloa	Stirling		N/A
Laurencekirk	Montrose, Stonehaven		Portlethen, Arbroath
East Midlands Airport Parkway	Derby, Nottingham, Long Eaton, Loughborough	Beeston, Loughborough	Leicester
Warwick Parkway	Warwick, Coventry	Claverdon, Lapworth, Hatton, Leamington Spa	Leamington Spa
Chatelherault	Hamilton Central	Shieldmuir	Hamilton West
Coleshill Parkway	Nuneaton	Wilnecote, Water Orton	Tamworth
Cross Keys	None (new line)		N/A
Edinburgh Park	South Gyle	South Gyle	Edinburgh + Haymarket
Glasshoughton	Pontefract Monkhill	Castleford	Normanton
Horwich Parkway	Blackrod, Lostock, Adlington	Westhoughton	Chorley
Larkhall	Hamilton Central	Shieldmuir	Hamilton West
Llantwit Major	None	Barry	Pencoed
Merryton	Hamilton Central	Shieldmuir	Hamilton West
Rhoose - Cardiff International Airport	Barry	Barry	Pencoed

4.8 For some stations the selection of potential abstraction stations and counterfactual stations was extremely difficult, in particular those on new (passenger) lines.

4.9 Alloa is a new station on what was a freight only line to Stirling. People needing to travel by public transport prior to Alloa station opening would use either local bus services or would access the rail network at Stirling. The potential abstraction station is therefore Stirling, however the passenger volumes at Stirling are considerable and it was considered unlikely that any changes in demand as a result of Alloa station opening would be undetectable. However there were no alternative "potential abstraction stations". Whilst Glasgow Queens Street was considered as a counterfactual station it was discounted on the grounds of having very different services to either Stirling or Alloa.

4.10 Potential abstraction and counterfactual stations for those stations on newly opened railway lines were also very difficult to identify. For Brunstane and Newcraighall on the Edinbugh Crossrail line only one potential abstraction station

(Musselburgh) could be identified and no counterfactual station could be identified. This meant that whilst trends in demand at Musselburgh could be noted, conclusions could not be drawn as to whether it was due to a general decline in demand at stations in the area or whether it was attributable to the new stations.

4.11 On the Ebbw Valley Line the potential abstraction and counterfactual stations were identified by focussing on the local road network and identifying stations served by good east-west roads as "potential abstraction stations" and adjacent stations on the valley lines as counterfactual stations. Whilst this approach successfully identified stations for Ebbw Vale Parkway, only a potential abstraction station could be identified for Newbridge and for the other stations on the Ebbw Valley line the road network between valleys was so poor that it was deemed that rail travel in advance of the local station opening would be an unattractive option, and therefore abstraction was not likely to be an issue.

Phase 1 Analysis and Findings

4.12 Passenger demand information was obtained from the LENNON database (which had been prepared in summary format for the MOIRA Replacement study). Annual passenger journeys information was therefore available for the financial years 1990/1 to 2008/9.

4.13 Reviewing the growth in demand at stations in the year prior to the new station opening identified a number where possibly a-typical growth was experienced: specifically very high growth or negative growth. It was therefore considered prudent to also consider the average annual demand growth over the 5 years prior to the new station opening.

4.14 Figure 4.2 shows the changes in demand at all the nominated and counterfactual stations. Where the new station opened in 2008/9 there was no actual demand data available for the year when demand at the potential abstraction station would be affected by the new station: these years are highlighted in red.

4.15 Evidence of possible abstraction was deemed to be instances where demand growth at the potential abstraction station falls (where the growth rate is lower than before or is negative) AND demand growth at the counterfactual station(s) does not fall.

4.16 The final column of Figure 4.2 concludes whether there is any evidence of demand for a new station being abstracted from one or more existing stations.

4.17 Figure 4.3 summarises the analysis. In this table stations are coloured according to demand growth between the year prior to the station opening and the year after the station opened:

- Where stations are red this indicates that demand growth fell between these years (with demand growth either remaining positive but slowing, or demand actually falling)
- Where stations are orange this indicates negligible change in demand growth
- Where stations are green this indicates that demand growth rose over the period.

FIGURE 4.2 PHASE 1 ANALYSIS OF DEMAND ABSTRACTION

New Stations				POTENTIAL ABSTRACTION STATIONS																NOMINATED COUNTERFACTUAL STATIONS								Analysis Indicates Possible Abstraction?
Station Name	Opening Date	Unaffected Year	Affected Year		Unaffected 5 Year Ave	Growth Unaffected	Growth Affected		Unaffected 5 Year Ave	Growth Unaffected	Growth Affected		Unaffected 5 Year Ave	Growth Unaffected	Growth Affected	Station Name	Unaffected 5 Year Ave	Growth Unaffected	Growth Affected	Station Name	Unaffected 5 Year Ave	Growth Unaffected	Growth Affected	Station Name	Unaffected 5 Year Ave	Growth Unaffected	Growth Affected	Station Name	Unaffected 5 Year Ave	Growth Unaffected	Growth Affected	
Alloa	19.05.2008	2007/8	2008/9	Stirling	7.27%	6%	5%																						Unclear
Aylesbury Vale Parkway	14.12.2008	2008/9	2009/10	Aylesbury	2.09%	-1%																						Stoke Mandeville	1.93%	3%		Westcott	1.83%	8%		Insufficient time elapsed
Brunstane	02.06.2002	2001/02	2002/3													Musselburgh	1.27%	-13%	-2%										No
Chandlers Ford	12.12.2004	2004/5	2005/6	Eastleigh	4.78%	3%	1%	Romsey	8.98%	9%	5%																	Shawford	2.09%	-13%	13%	Dunbridge	0.63%	8%	25%	Yes
Chatelherault	11.12.2005	2005/6	2006/7	Hamilton Central	4.69%	22%	7%									Shieldmuir	-7.96%	23%	30%									Hamilton West	8.25%	23%	-3%					No
Coleshill Parkway	19.08.2007	2006/7	2007/8	Nuneaton	5.28%	6%	2%									Wilnecote Staffs	4.55%	1%	27%	Water Orton	10.25%	12%	8%	Tamworth	8.22%	6%	2%					No
Corby	23.02.2009	2008/9	2009/10	Kettering	4.05%	3%										Peterborough	2.52%	1%										Market Harboro	5.89%	2%		Wellingborough	4.05%	3%		Insufficient time elapsed
Crosskeys	07.06.2008	2007/8	2008/9																															-
East Midlands Airport Parkway	26.01.2009	2008/9	2009/10	Derby	4.01%	4%		Nottingham	1.19%	2%		Long Eaton	3.56%	3%		Beeston	3.28%	1%		Loughboro Leics	3.92%	4%		Leicester	2.57%	3%						Insufficient time elapsed
Ebbw Vale Parkway	06.02.2008	2007/8	2008/9													Abergavenny	3.18%	6%	2%	Rhymney	6.94%	3%	-9%	To Phil	-14.94%	0%	7%	Bethdr	-14.07%	-13%	4%	Yes
Edinburgh Park	08.12.2003	2003/4	2004/5	South Gyle	0.65%	-3%	14%									South Gyle	0.65%	-3%	14%									Edinburgh	4.36%	7%	7%	Haymarket	5.19%	5%	36%	No
Glasshoughton	12.12.2004	2004/5	2005/6	Pontefract Mkkt	-8.14%	-23%	55%									Castleford	3.31%	12%	7%									Normanton	2.71%	13%	14%					No
Horwich Parkway	30.05.1999	1998/1999	1999/2000	Blackrod	9.55%	28%	62%	Lostock Parkway	6.01%	-6%	-7%	Adlington Lancs	3.80%	-6%	13%	Westhoughton	2.84%	1%	21%									Chorley	3.27%	4%	8%					No
Imperial Wharf	28.09.2009	2008/9	2009/10	West Brompton	11.03%	-7%																						Kensngtn Olympia	0.08%	-9%		Wandsworth Town	5.80%	13%		Insufficient time elapsed
Larkhall	11.12.2005	2005/6	2006/7	Hamilton Central	4.69%	22%	7%									Shieldmuir	-7.96%	23%	30%									Hamilton West	8.25%	23%	-3%					No
Laurencekirk	18.05.2009	2008/9	2009/10	Montrose	5.31%	-1%		Stonehaven	6.71%	3%																		Portlethen	15.90%	-10%		Arbroath	5.14%	-4%		Insufficient time elapsed
Liverpool South Parkway	11.06.2006	2005/6	2006/7	Hunts Cross	6.41%	36%	5%	Cressington	12.41%	27%	8%	West Allerton	3.93%	24%	-3%													Aigburth	11.17%	34%	2%	Hough Green	-0.34%	4%	-1%	No
Llanharan	09.12.2007	2007/8	2008/9																															-
Llantwit Major	10.06.2005	2004/5	2005/6													Barry	2.56%	-3%	6%									Pencoed	2.37%	10%	-2%					No
Merryton	11.12.2005	2005/6	2006/7	Hamilton Central	4.69%	22%	7%									Shieldmuir	-7.96%	23%	30%									Hamilton West	8.25%	23%	-3%					No
Mitcham Eastfields	02.06.2008	2007/8	2008/9	Mitcham Junction	3.39%	8%	-7%	Streatham	-4.34%	-2%	-1%					Tooting	-6.11%	-8%	-5%									Hackbridge	0.48%	4%	-1%	Carshalton	0.62%	6%	-3%	No
Newbridge	06.02.2008	2007/8	2008/9													Hengoed	-4.17%	0%	7%	Ystrad Mynach	0.43%	8%	8%									Unclear
Newcraighall	02.06.2002	2001/02	2002/3													Musselburgh	1.27%	-13%	2%													No
Rhoose - CIP	10.06.2005	2004/5	2005/6													Barry	2.56%	-3%	6%									Pencoed	2.37%	10%	-2%					No
Risca and Pontymister	06.02.2008	2007/8	2008/9																															-
Rogerstone	06.02.2008	2007/8	2008/9																															-
Shepherds Bush	29.09.2008	2007/8	2008/9	Kensngtn Olympia	3.34%	6%	-9%																					West Brompton	14.34%	8%	-7%					No
Warwick Parkway	08.10.2000	1999/2000	2000/01	Warwick	7.72%	10%	3%	Coventry	5.69%	4%	-3%					Claverdon	0.74%	8%	-5%	Lapworth	-5.43%	-6%	-5%	Leamington Spa	9.59%	8%	6%					Possible

4.18 Evidence of possible demand abstraction was deemed to be instances where potential demand abstraction stations were red and counterfactual stations were green.

4.19 The analysis indicates that

- There is possible evidence of demand for Chandlers Ford, Ebbw Vale Parkway and Warwick Parkway.
- Whilst demand growth at one or more of the proposed abstraction stations falls in the examples for Coleshill Parkway, Larkhall, Liverpool South Parkway, Shepherds Bush, Merryton and Mitcham Eastfields, demand growth at the counterfactual stations also falls, such that it cannot be concluded that demand abstraction is the cause of the fall in demand at the proposed abstraction stations.
- There are a number of stations which have opened comparatively recently and for which no demand data is available for the post-opening year.

4.20 One issue which was raised during the analysis is whether analysis of annual demand growth is likely to "hide" the impact of demand abstraction. It was therefore recommended that any further analysis of abstraction should consider trends in demand growth over 4-weekly periods.

FIGURE 4.3 SUMMARY ANALYSIS AND CONCLUSIONS OF DEMAND ABSTRACTION

New Station	Opening Date	Potential Abstraction Stations			Nominated Counterfactual Stations		Analysis Indicates Possible Abstraction?
Alloa	19.05.2008	Stirling					Unclear
Aylesbury Vale Parkway	14.12.2008	Aylesbury			Stoke Mandeville	Wendover	Insufficeient time elapsed
Brunstane	02.06.2002			Musselburgh			No
Chandlers Ford	12.12.2004	Eastleigh	Romsey		Shawford	Dunbridge	Yes
Chatelherault	11.12.2005	Hamilton Central		Shieldmuir	Hamilton West		No
Coleshill Parkway	19.08.2007	Nuneaton		Wilnecote Staffs	Tamworth		No
Corby	23.02.2009	Kettering		Peterborough	Market Harboro	Wellingborough	Insufficeient time elapsed
Crosskeys	07.06.2008						-
East Midlands Airport Parkway	26.01.2009	Derby	Nottingham	Beeston	Leicester		Insufficeient time elapsed
Ebbw Vale Parkway	06.02.2008			Abergavenny	Tir Phil	Brithdir	Yes
Edinburgh Park	08.12.2003	South Gyle		South Gyle	Edinburgh	Haymarket	No
Glasshoughton	12.12.2004	Pontefract Mnkhl		Castleford	Normanton		No
Horwich Parkway	30.05.1999	Blackrod	Lostock Parkway	Westhoughton	Chorley		No
Imperial Wharf	28.09.2009	West Brompton			Kensngtn Olympia	Wandsworth Town	Insufficeient time elapsed
Larkhall	11.12.2005	Hamilton Central		Shieldmuir	Hamilton West		No
Laurencekirk	18.05.2009	Montrose	Stonehaven		Portlethen	Arbroath	Insufficeient time elapsed
Liverpool South Parkway	11.06.2006	Hunts Cross	Cressington		Aigburth	Hough Green	No
Llanharan	09.12.2007						-
Llantwit Major	10.06.2005			Barry	Pencoed		No
Merryton	11.12.2005	Hamilton Central		Shieldmuir	Hamilton West		No
Mitcham Eastfields	02.06.2008	Mitcham Junction	Streatham	Tooting	Hackbridge	Carshalton	No
Newbridge	06.02.2008			Hengoed			Unclear
Newcraighall	02.06.2002			Musselburgh			No
Rhoose - CIP	10.06.2005			Barry	Pencoed		No
Risca and Pontyminster	06.02.2008						-
Rogerstone	06.02.2008						-
Shepherds Bush	29.09.2008	Kensngtn Olympia			West Brompton		No
Warwick Parkway	08.10.2000	Warwick	Coventry	Claverdon	Leamington Spa		Possible

Key:
Demand growth falls
Demand growth increases
Negligible change indemand growth
No "post-opening" data

Phase 2 Analysis and Findings

4.21 Building on the analysis and findings from Phase 1, Phase 2 considered growth in demand over 4-weekly periods, to understand whether there was any evidence of abstraction that had been "hidden" when looking at the high level annual data.

4.22 One of the disadvantages of analysing abstraction through 4-weekly passenger demand data is that LENNON data at this level of detail is only readily accessible for 4 years. It was therefore only possible to consider whether there was evidence of demand abstraction for stations opened after 2006, where these are identified in Figure 4.4.

FIGURE 4.4 STATIONS SELECTED FOR ANALYSIS IN PHASE 2

New Station	Opening Date	Abstraction Stations	Counterfactual stations
Alloa	19.05.2008	Stirling	N/A
Aylesbury Vale Parkway	14.12.2008	Aylesbury and Bicester	Stoke Mandeville, Wendover
Coleshill Parkway	19.08.2007	Nuneaton, Wilnecote, Water Orton	Tamworth
Corby	23.02.2009	Kettering, Peterbrough	Market Harborough, Wellingborough
East Midlands Airport Parkway	26.01.2009	Derby, Nottingham, Long Eaton, Loughborough, Beeston	Leicester
Ebbw Vale Parkway	06.02.2008	Abergavenny, Rhymney	Tir-phil, Brithdir, Bargoed, Cwmbran
Imperial Wharf	28.09.2009	West Brompton	Kensington Olympia, Wandsworth Town
Laurencekirk	18.05.2009	Montrose, Stonehaven	Portlethen, Arbroath
Shepherds Bush	29.09.2008	Kensington Olympia	West Brompton

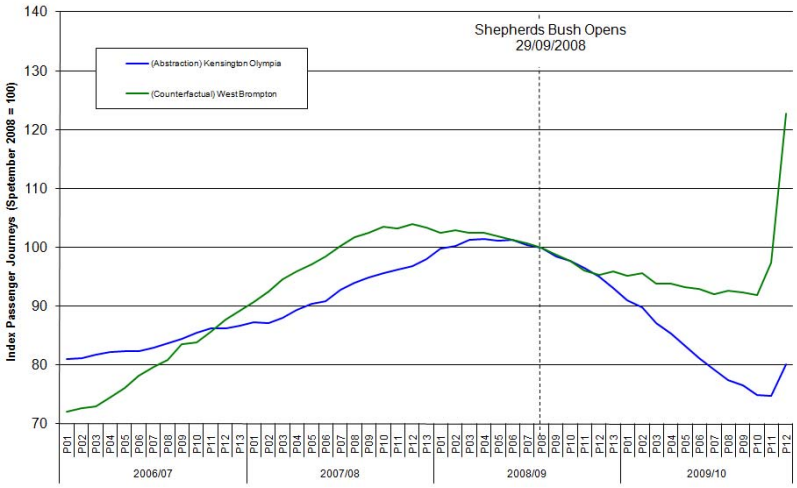
4.23 The 4-weekly passenger demand data for each station was converted into a moving annual average time series (in order to balance out the seasonal changes in demand which are unrelated to abstraction). The moving annual average passenger demand was then indexed, to allow the trends in demand for the new station, potential abstraction station and counterfactual station to be clearly presented on the same graph. In a number of instances the difference in the passenger volume at the stations considered would have made identifying trends in passenger demand difficult to identify when presented in graph form.

Stations where there is possible evidence of Demand Due to Abstraction

4.24 Analysis of potential demand being abstracted by Shepherds Bush station is presented in shown in Figure 4.5. The graph shows that 4 periods after Shepherds Bush station opens there is a noticeable difference in the demand trends between the Kensington Olympia (the nominated Abstraction station) and West Brompton (the Counterfactual station). Demand at the West Brompton increases slightly then shows a slow decline, however demand at Kensington Olympia starts to decline immediately Shepherds Bush station opens, and declines at a faster rate than West Brompton. This analysis seems to indicate that there is evidence of demand for Shepherds Bush station being abstracted from Kensington Olympia.

4.25 The sudden growth in demand for all the three stations in the second half of 2009/10 is noted. However this is understood to be due to the double-counting of passenger journeys data for passengers using Pay As You Go Oystercards (an issue which is being resolved and is unrelated to demand abstraction).

FIGURE 4.5 INVESTIGATION OF ABSTRACTION BY SHEPHERDS BUSH STATION

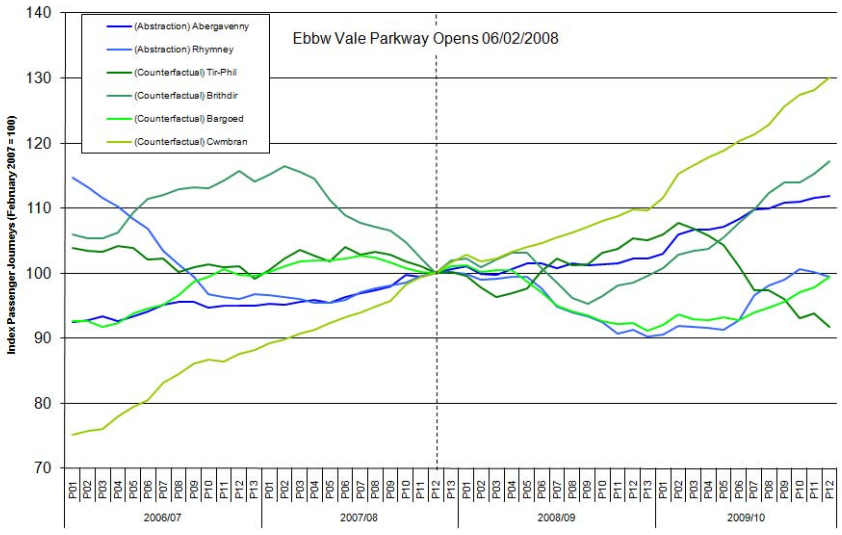


4.26 Figure 4.6 shows trends in demand at stations from which demand may have been abstracted by Ebbw Vale Parkway, and the associated counterfactual stations. Due to difficulties in choosing abstraction and counterfactual stations in the valleys of south Wales, two pairs of abstraction and counterfactual stations were chosen:

- Abergavenny (proposed abstraction station) and Cwmbryn (Counterfactual)
- Rhymney (proposed abstraction station) and Bargoed (Counterfactual station)

4.27 Abergavenny and Cwymbran are on the same line of route but Cwymbran has grown at a faster rate than Abergavenny and there is evidence of a stagnation in demand growth at Abergavenny for a few periods immediately after the opening of Ebbw Vale Parkway. A review of the absolute numbers of passengers using each station shows that passenger volumes at Ebbw Vale Parkway station are only 25% lower than those at Abergavenny. It was concluded that the analysis may represent possible evidence of abstraction from Abergavenny – with passengers no longer driving along the Heads of Valleys road to access the rail network at Abergavenny.

FIGURE 4.6 INVESTIGATION OF DEMAND ABSTRACTION BY EBBW VALLEY PARKWAY STATION



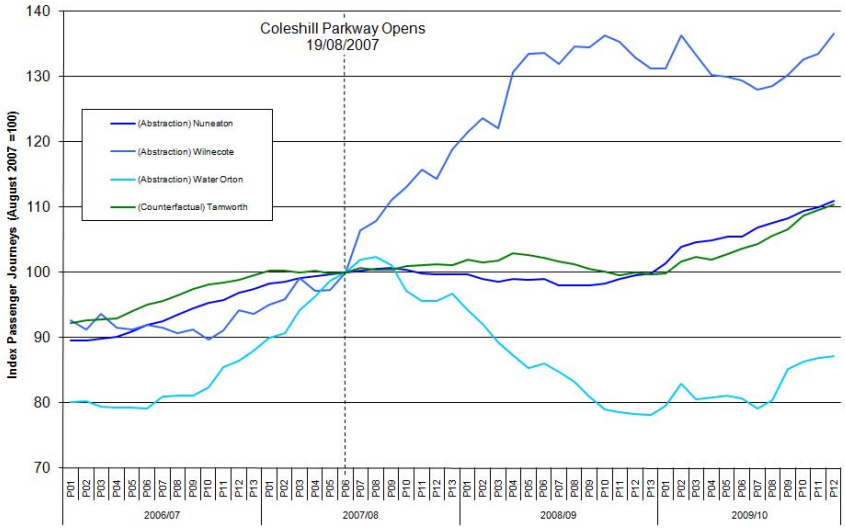
4.28 Rhymney (proposed abstraction station) and Bargoed (Counterfactual station) are on the same line of route and show a similar pattern of demand, there is no evidence of abstraction

4.29 Choosing stations from which demand may be abstracted by Coleshill Parkway was a difficult task. Water Orton is a likely candidate, however the area is well served by buses to the city centre and therefore local trips to Birmingham are unlikely to be abstracted. Nuneaton was the only other possible station from which demand might be abstracted, although this was also considered unlikely.

4.30 Analysis of demand growth appears to show evidence of demand being abstracted by Coleshill Parkway from Water Orton. Firm conclusions are difficult to draw due to the variability in demand at Wilnecote (Counterfactual station) and Water Orton (proposed abstraction station), both of which have an infrequent train service and a low demand c4,000 passenger journeys per period compared to c7,000 at Coleshill Parkway.

4.31 However, because of the 2tph frequency at Coleshill and an extremely infrequent train service at Water Orton (one train every 2 hours), and the fact that Water Orton demand fell steadily after Coleshill Parkway opened means that abstraction may be the cause of the decline in demand at Water Orton decline. It is unlikely that it would be "local" trips that are abstracted from Water Orton (as these would be well served by the bus service), however access to the rail network for longer distance trips may be those that have transferred to Coleshill Parkway.

FIGURE 4.7 INVESTIGATION OF ABSTRACTION BY COLESHILL PARKWAY STATION



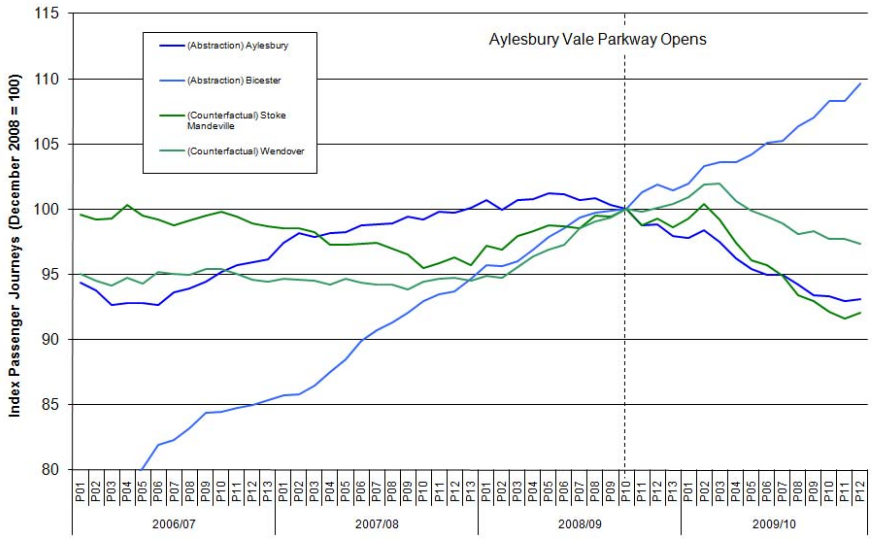
4.32 There is no evidence of abstraction from Nuneaton, with demand at Nuneaton following a similar patter to that at Tamworth (the associated counterfactual station). Following the opening of Coleshill Parkway demand at Nuneaton grew stronger than at Tamworth (where growth had stagnated a few periods prior to Coleshill Parkway opening).

Stations where there is no evidence of Demand Due to Abstraction

4.33 Figure 4.8 shows that the basis for the analysis into evidence of abstraction of demand by Aylesbuy Vale Parkway station is good, with demand trends at the two Counterfactual stations (Stoke Mandeville and Wendover) being very similar.

4.34 Demand at Aylesbury started to decline prior to Aylesbury Vale Parkway opening, and fell at a faster rate since the opening of the new station. The reduction in demand at Aylesbury has been from approximately 86,000 passenger journeys to 80,000 passenger journey per period, however total passenger demand at Aylesbury Vale Parkway station accounts for only 4,000 passenger journeys each period. Therefore the reduction in demand at Aylesbury is not purely (if at all) due to abstraction by Aylesbury Vale Parkway.

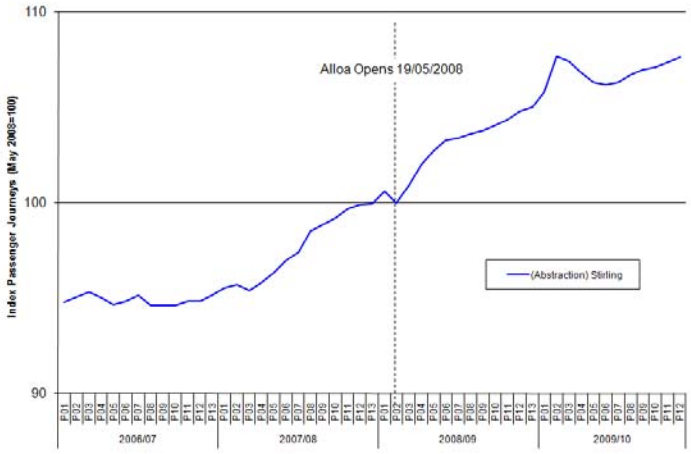
FIGURE 4.8 INVESTIGATION OF ABSTRACTION BY AYLESBURY VALE PARKWAY



4.35 Despite Bicester being on a different line of route to Aylesbury vale Parkway, it was considered as a possible station from which demand might be abstracted. However, demand at Bicester has grown steadily and faster than the Counterfactual stations (which are on a separate line of route) over the analysis period - indicating no evidence of abstraction.

4.36 As described previously, selecting potential abstraction and counterfactual stations for Alloa was difficult, with any abstraction from Stirling probably likely to be hidden by other effects on demand at this large station.

FIGURE 4.9 INVESTIGATION OF ABSTRACTION BY ALLOA STATION

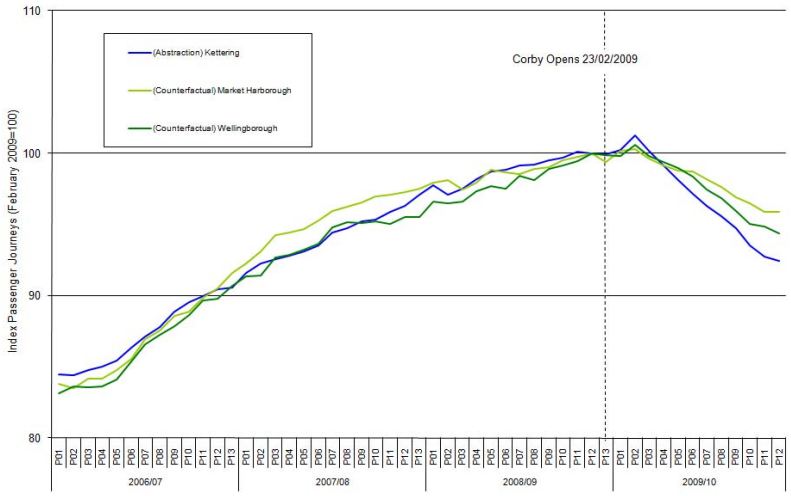


4.37 Figure 4.9 shows that trends in demand show no evidence of abstraction from Stirling, with rail demand at Stirling actually increasing since Alloa station opened. Furthermore passenger demand at Alloa is approximately 30,000 journeys per period compared to approximately 160,000 passenger at Stirling, so abstraction would need to be substantial for it to show in demand trend analysis.

4.38 Whilst Corby station opened in February 2009, the train service provided was poor until April 2009 when sufficient rolling stock became available. In terms of the location of the station – which is on the route to Oakham off the Midland Mainline, it is extremely unlikely that anyone would transfer from stations such as Market Harborough and Kettering, which are both on the mainline.

4.39 Figure 4.10 shows that demand at these stations fell at the same time as Corby opened, however this is unlikely to be due to people transferring to Corby unless the car parks at Kettering or Market Harborough are full.

FIGURE 4.10 INVESTIGATION OF ABSTRACTION BY CORBY STATION



Conclusions and Recommendations

4.40 The analysis shows that there is possible evidence of demand being abstracted by:

- Shepherds Bush (abstraction from Kensington Olympia)
- Ebbw Vale Parkway (abstraction from Abergavenny) and
- Coleshill Parkway (abstraction from Water Orton)

4.41 However no evidence found of demand abstraction at:

- Aylesbury Vale Parkway (no abstraction evident from Aylesbury or Bicester)
- Alloa (no abstraction evident from Stirling) and
- Corby (no abstraction evident at Kettering)

4.42 Three of the stations have opened too recently for sufficient data to be available to analyse for evidence of demand abstraction, namely:

- East Midlands Parkway
- Imperial Wharf
- Laurencekirk

4.43 It is recommended that 4-weekly demand data for these stations and their nominated and counterfactual stations is obtained and supplemented over the next 18 months. Analysis can then be undertaken to investigate whether there is evidence of abstraction. Transport Scotland have noted that finding evidence of abstraction by Laurencekirk will be difficult as any abstraction from Montrose and Stonehaven will be masked due to suppressed demand at these stations (as their car parks are already at capacity).

4.44 Following the presentation of the analysis, Transport Scotland suggested that an alternative "potential abstraction" station for Alloa would be Dunblane. It was also highlighted that demand abstraction was considered a serious risk at the time of opening Newcraighall, with demand possibly being abstracted from stations on the North Berwick route. However it was noted that evidence of abstraction may be hard to find as demand for these stations is suppressed due to the car parks of these stations being at or near capacity.

4.45 The analysis of abstraction in Phase 2 showed that there is value in analysing 4-weekly demand data (rather than annual data) when seeking evidence of abstraction. It is unfortunate that demand information at this level of disaggregation is not readily available for all new stations as it is likely that it could confirm the assertion that demand was abstracted by Warwick Parkway. It is recommended that it should be standard practice to identify potential abstraction stations and counterfactual stations and to collate 4-weekly passenger demand data for these stations in order to seek evidence of demand abstraction by new stations.

5 Backcasting Demand Forecasts for Stations

Introduction

5.1 The main objective of the New Stations study was to identify if demand for new stations was consistently under-forecast and if so, the reasons for this. One of the factors which will affect the forecasts is the assumed values of key explanatory variables and the choice of forecasting methodology adopted.

5.2 In order to consider the first of these the New Stations study undertook a backcasting exercise to test the impact of populating the available forecasting models with the outturn values of explanatory variables. Where the resulting forecasts produced accurate estimates of demand one can conclude that the forecasting methodology used was satisfactory.

5.3 However, where the back-cast results are significantly different from observed demand it is likely that the methodology used may omit a key explanatory variable or need adjustments to parameters.

5.4 Whilst four of the demand models used to prepare forecasts were available for this study, only two (those for Aylesbury Vale Parkway and Liverpool South Parkway) could be used in the backcasting exercise. The models used to forecast Ebbw Valley Line and Chandlers Ford demand used car and bus volumes and journey times as input variables and so could not be updated without additional data being collated.

Aylesbury Vale Parkway Backcasting

Introduction

5.5 Aylesbury Vale Parkway was opened for service on 14th December 2008. The station is accessible by bus services which serves the outlying villages during peak hours. The park & ride capability and adjacent A41 road provides a multi-modal interchange for transport users. Car parking is available for 500 vehicles (at least 100 of which is set aside for Park and Ride bus services to Aylesbury).

5.6 The train service planned was to extend Aylesbury services to London by 2 trains per hour (tph) in the Peak and 1tph in the Off Peak. The actual service is as planned and the journey time to London Marylebone is approximately 60 minutes.

Forecasting Methodology and Original Demand Forecasts

5.7 The demand forecasting methodology assumed that the key generators of demand for the station would be the existing local population and planned new housing developments at Berryfields Major Development Area. The frequency and journey time of the train service offered to London was also an influence on the level of demand that would be expected. Table 5.1 shows the timings of housing completions at Berryfields that was assumed in the original demand forecasts. This housing was forecast to result in nearly 55,000 passenger journeys (p/a) at Aylesbury Vale Parkway.

TABLE 5.1 ORIGINAL ASSUMPTIONS FOR DEVELOPMENT OF BERRYFIELDS MDA

Year (end)	Estimate of build	Cumulative build	Household size	Population
2005	0	0	2.51	0
2006	50	50	2.51	126
2007	300	350	2.51	753
2008	350	700	2.51	879
2009	350	1050	2.51	879
2010	350	1400	2.51	879
2011	350	1750	2.51	879
2012	350	2100	2.51	879
2013	350	2450	2.51	879
2014	350	2800	2.51	879
2015	200	3000	2.51	502
Total		**3000**		**7530**

5.8 Since the demand forecasts were only available from 2009/10 onwards, they had to be converted in order for comparison with the observed demand available for the New Stations study. The 2009/10 forecast of 95,000 journeys (comprising 16,000 generated journeys, 24,000 abstracted from Aylesbury and 55,000 from Berryfields of which 7,000 would have been abstracted from Aylesbury).

5.9 As the station opened on the 14th of December 2008, demand in 2008/9 would only be for 4 periods. The total demand forecast was therefore factored down accordingly, giving a forecast demand of 29,000 passenger journeys. This compares with the 13,066 actual journeys made (as recorded in LENNON, excluding travelcards). This comparison suggests that the demand forecasts are significantly over-forecasting demand (however it is acknowledged that comparing forecasts of demand with actual demand for 4 months of the first year of operation is not an ideal assessment of the performance of the forecasts).

Backcasting and Revised Forecasts

5.10 The economic recession and its impact on the construction industry resulted in the stalling of housing development at Berryfields MDA, with no houses completed before 2008/9.

5.11 A review of the other drivers of demand indicated that the original estimates of existing population were appropriate, and the train service delivered was consistent with that assumed in the forecasts.

5.12 However, a review of developments in the area based on published information showed that whilst the development of Berryfields MDA has stalled, construction of houses at Weedon Hill is underway, with 328 houses completed by the end of 2008,

many of which are occupied (Source: http://www.aylesburyvaleadvantage.co.uk/2009/07/weedon-hill/)

5.13 A revised demand forecast was therefore prepared for Aylesbury Vale Parkway, which excluded Berryfields but included Weedon Hill. Other variables remained unchanged. The backcasting exercise resulted in a revised forecast of 12,700 journeys in 2008/9 (achieved by factoring down the revised full year forecast of 41,400 passenger journeys), which is consistent with the actual demand.

5.14 Latterly the LENNON passenger journeys data for 2009/10 has been made available, which shows that 49,400 journeys were made, which shows that the station is actually over-performing compared to the forecasts.

Liverpool South Parkway Backcasting

Introduction

5.15 Liverpool South Parkway station is a railway station and bus interchange in Garston. The main line platforms at Liverpool South Parkway are on the site of the former Allerton station, which closed in 2005 to allow the required rebuilding work to take place. The Northern Line platforms are completely new, replacing a station at Garston which was slightly further west of the current station. The concourse, bus station and car park are built on land that was once the home of South Liverpool F.C

5.16 The station is located towards the southern end of Merseyrail's Northern Line and on the junction of two main lines: the City Line from Liverpool towards Manchester via Warrington and also towards London via Crewe on the Liverpool branch of the West Coast Main Line. The station was built to improve public transport access to Liverpool John Lennon Airport, and also to provide new journey opportunities for rail passengers in south Liverpool by allowing easy interchange between Northern Line, City Line and West Coast Main Line services.

5.17 It has a large park and ride facility as well as integrated transport links to Liverpool John Lennon Airport and the city centre.

Forecasting Methodology and Original Demand Forecasts

5.18 Demand forecasts for Liverpool South Parkway were prepared using three models:

- a logit mode choice model to forecast the demand for park and ride;
- an airport accessibility model; and
- a standard PDFH rail demand elasticity model reflect the impact of changes in journey time on the local area.

5.19 The key generators of demand for the station were assumed to be the rail service pattern, the frequency, quality and marketing of the shuttle bus service to the airport and the number of trips to the airport.

5.20 Table 5.3 shows the forecast demand for the station in the second year of opening. This demand excludes MerseyRail Travelcard journeys which will account for a significant proportion of demand (but are excluded from the quoted forecasts in order for consistency with demand data from LENNON. The comparison of forecast

and observed demand shows that actual demand has been significantly lower than forecast demand.

5.21 Possible reasons considered in the backcasting exercise for the over-estimation of demand were the key demand drivers of: rail service pattern; shuttle bus service provision; and airport demand growth

5.22 The eventual rail service pattern delivered was not what was expected at the time of the appraisal, certainly on opening although over time it has got closer to that envisaged.

5.23 The original appraisal assumed the shuttle bus would serve the airport at a frequency of 6 buses per hour for eighteen hours of the day with an 8 minute journey time. However, the actual frequency is 3 buses an hour from Monday to Saturday with a journey time of 10 minutes.

Backcasting and Revised Forecasts

5.24 Given that Liverpool South Parkway was designed to be both a producer and attractor of rail trips (where producer trips are defined as trips whose home station is LSP), demand was dis-aggregated into producer trips and attractor trips (shown in Table 5.2). Whilst actual demand for trips produced by LSP is only 10% below what was forecast, trips attracted to the station are less than half what was forecast.

5.25 This analysis indicated that the backcasting should focus on the shuttle bus link to the airport, which is used by passengers using Liverpool South Parkway to access the airport.

TABLE 5.2 BACKCASTING FOR LIVERPOOL SOUTH PARKWAY

	Total Journeys	Producer Journeys	Attractor Journeys
Actual demand (2008/9)	465,000	358,000	107,000
Original Forecast	640,000	399,000	241,000
Difference	-27%	-10%	+125%
Back-cast	521,000	399,000	122,000
Difference	-11%	-10%	-12%

5.26 The backcasting therefore took the form of adjusting the airport accessibility model to include the actual bus frequency and journey time. As shown in Table 5.2, this significantly reduced the forecast demand for attractor trips, with the back-cast being within 12% of actual demand.

5.27 When the back-cast of attractor trips is added to the original forecast of producer trips the total forecast demand is within 11% of actual demand, a reasonable error margin when forecasting demand for new stations.

Conclusions and Recommendations

5.28 For both stations considered in the backcasting exercise, the main reason for the difference between the original forecasts and actual demand was found to be the different outturn value of one of the key demand drivers. In the case of Aylesbury Vale Parkway the key factor was stagnation of the planned local housing development. For Liverpool South Parkway it was the lower than planned frequency of the bus service used by rail passengers to access Liverpool John Lennon Airport.

5.29 The analysis shows the value of backcasting analysis in understanding the reason for forecasts being different from observed demand. As a "post-implementation" analysis tool it is useful, however this does depend on the original forecasting models being readily available, and sufficiently well designed and documented that they can be used by an independent reviewer. It is recommended that the provision of forecasting models and their supporting documentation is made a requirement for submissions for any new station.

5.30 Whilst backcasting is a fairly straightforward task for some studies (such as Aylesbury Vale Parkway and Liverpool South Parkway), for others it would require the collation of data which would be costly and time-consuming to collect. For example, the analysis in the New Stations study has shown that there is a need to understand whether a significant proportion of the difference between actual and forecast demand for Ebbw Vale Parkway is due to Cardiff being the end of the rail route, yet to do so would require undertaking road side interviews on roads which were originally outside the defined study area. There will inevitably be constraints on the extent to which backcasting can be used as a tool to evaluate demand.

6 Analysis of Demand Produced by and Attracted to New Stations

Introduction

6.1 The review of demand forecasting reports for new stations rarely mentioned the two types of demand for the station:

- Trips "produced by" at a station are those where the starting point of the return trip is the new station, for example trips made by people living in the local area.
- Trips "attracted to" a station are those where the home station is elsewhere and people are travelling to the new station to visit people living there or employment or leisure opportunities.

6.2 In many instances the selection and application of the forecasting methodologies generally showed no evidence that they adequately reflected the existence of the two markets.

6.3 The review of the different methodologies used to forecast demand for stations rarely found mention of the market for trips attracted by the station, although in a small number of instances it was mentioned but then wholly ignored in the forecasting methodology. Findings in Phase 1 of this study indicated that a possible reason for under-forecasting demand could be due to forecasts "missing" this aspect of demand. Evidence of the likely size of the market for trips attracted to the new stations was therefore sought to support recommendations to promoters that this demand should not be over-looked.

6.4 The categorisation of new stations by DfT identified that a significant number of stations are destination stations, which would be expected to have sizeable markets for trip attracted to the station – for example having significant employment or leisure opportunities or an airport nearby.

6.5 It was therefore considered of value to investigate the relative size of the two types of demand (trips produced by the station and trips attracted to the station) and to confirm whether the evidence supported the categorisation of stations (with stations categorised as being in part of wholly "destination stations" having a significantly higher proportion of attracted trips).

6.6 It was also considered important to understand how "concentrated" each type of demand was, in terms of the proportion of total demand accounted for by a handful of flows. This would indicate whether demand forecasting based on analysis of a small number of flows was sufficient to representative of demand for the station.

Relative Importance of Trips Produced by and Attracted to the New Station

6.7 LENNON journeys data was used to identify the proportion of trips "produced by" and "attracted to" the new station.

6.8 The analysis showed that for the 11 new stations categorised as being "Destination stations" (with all but one also being residential stations and/or parkway stations) an average of 48% of trips are accounted for by those attracted to the new station (although no data was available for Imperial Wharf or Corby).

6.9 An average of 27% of demand at the 26 new stations which are not categorised as destination stations is "attracted demand" (no data was available for Laurencekirk).

6.10 However, these figures are averages, and should not be used as "rules of thumb". There is considerable variation in the proportion of demand accounted for by attractor trips. For destination stations the proportion of trips accounted for by attractor trips varies from 23% at Liverpool South Parkway to 85% at West Brompton and 70% at Shepherds Bush. Stations which are not considered "destination stations" have between 10% (at Aylesbury Vale Parkway) and 63% (at Beauly) of trips attracted to the station.

6.11 The analysis shows that even for new stations which are not anticipated to be "destination stations" it is important that forecasts of demand include an assessment of trips attracted to the station. Parameters used in trip rate forecasts implicitly take some degree of attracted trips into account, however other methodologies need to specifically forecast these trips. If this is not done then demand will be significantly under-estimated.

6.12 Whilst the analysis identifies some key issues to be aware of, it is noted that due to the way in which tickets are sold, there will be some margin of error in the analysis. In particular on regional routes approximately 15% of passenger journeys are made using single tickets, and this figure will be higher on some routes. This will mean that analysis will forecast a higher proportion of attractor trips than if these journeys were made on "return tickets". This may explain the high proportion of attractor trips for Beauly.

6.13 It is recommended that the promoter should consider the likely importance of the market for trips attracted to the station. Subsequently the demand methodology chosen should reflect this source of demand and the demand forecasting documentation should specify how attracted trips have been forecast.

Relative Concentration of Trips Produced by and Attracted to the New Station

6.14 The forecasts for a number of new stations considered only demand to (and from) a one or two destinations. The extent to which this might under-estimate demand was investigated by undertaking analysis of the extent to which actual demand from an to the new stations is concentrated on the main flows.

6.15 To assess the proportion of total demand accounted for by individual flows, analysis of the demand for a number of the new stations was undertaken. Trips produced by the station and attracted to the station were treated separately.

6.16 The proportion of total demand accounted for by the:

- Top flow
- Top 3 flows and
- Top 5 and Top 10 flows

was then calculated in order to compare the relative concentration of demand between trips produced at the station and attracted to the station.

6.17 12 stations were selected for this analysis, with one representing each category (or combination of categories) of station.

6.18 The detailed results of this analysis (presented in Appendix B) are interesting in terms the destinations and origins of trips to each of the example stations, and could be valuable when reviewing proposals and demand forecasts for new stations.

6.19 Figures 6.1 and 6.2 show the detailed analysis for Coleshill Parkway and Chandlers Ford station, and are useful to explain the analysis of the concentration of demand for new stations.

FIGURE 6.1 ANALYSIS OF TRIPS PRODUCED BY AND ATTRACTED TO COLESHILL PARKWAY

Coleshill Parkway

Producer Journeys

Rank	Destination Code	Destination	Total	%
	Top Destination			
1	XBH	Birmingham BR	65,527	79.66%
	Top 3 Destinations			
1	XBH	Birmingham BR	65,527	79.66%
2	NUN	Nuneaton	5,605	6.81%
3	LEI	Leicester	2,644	3.21%
				89.69%
	Top 5			
1	XBH	Birmingham BR	65,527	79.66%
2	NUN	Nuneaton	5,605	6.81%
3	LEI	Leicester	2,644	3.21%
4	UNI	University Birm	1,294	1.57%
5	BHM	Birmingham N St	992	1.21%
				92.47%
	Top 10 Destinations			
1	XBH	Birmingham BR	65,527	79.66%
2	NUN	Nuneaton	5,605	6.81%
3	LEI	Leicester	2,644	3.21%
4	UNI	University Birm	1,294	1.57%
5	BHM	Birmingham N St	992	1.21%
6	WVH	Wolverhampton	313	0.38%
7	PBO	Peterborough	296	0.36%
8	SGB	Smethwick Gal Bg	264	0.32%
9	FWY	Five Ways	244	0.30%
10	WTO	Water Orton	238	0.29%
				94.12%

Attractor Journeys

Rank	Origin Code	Origin Station	Total	%
	Top Origin			
1	BHM	Birmingham N St	10,396	46.56%
	Top 3 Origins			
1	BHM	Birmingham N St	10,396	46.56%
2	NUN	Nuneaton	1,836	8.22%
3	XBH	Birmingham BR	1,099	4.92%
				59.71%
	Top 5 Origins			
1	BHM	Birmingham N St	10,396	46.56%
2	NUN	Nuneaton	1,836	8.22%
3	XBH	Birmingham BR	1,099	4.92%
4	LEI	Leicester	896	4.01%
5	LBO	Loughboro Leics	472	2.11%
				65.84%
	Top 10 Origins			
1	BHM	Birmingham N St	10,396	46.56%
2	NUN	Nuneaton	1,836	8.22%
3	XBH	Birmingham BR	1,099	4.92%
4	LEI	Leicester	896	4.01%
5	LBO	Loughboro Leics	472	2.11%
6	DDP	Dudley Port	381	1.71%
7	WVH	Wolverhampton	356	1.59%
8	XLD	London BR	329	1.47%
9	HNK	Hinckley Leics	297	1.33%
10	BUT	Burton On Trent	277	1.24%
				73.18%

6.20 Trips produced by Coleshill Parkway station are heavily concentrated on the flow to Birmingham (both BR and New Street), with 80% of all demand produced by Coleshill Parkway on this flow. Trips to Nuneaton and Leicester produced by Coleshill also account for a notable proportion of demand – such that these "Top 3" flows account for nearly 90% of demand accounted for by these three flows.

Any forecasts of demand produced at Coleshill could therefore reasonably prepared on the basis of the market for these three flows. Extending the analysis to forecast demand for additional flows would be of limited additional value – since the subsequent seven flows only account for a further 4.5% of demand. This station is fairly typical of stations of stations which are not destination stations.

6.21 However, whist demand produced by Coleshill Parkway is concentrated on a handful of flows, the demand attracted to the station is more widely spread. Whilst the key flow remains Coleshill – Birmingham, this flow only accounts for 50% of demand, and extending the analysis to the Top 3 flows only accounts for 60% of demand. This suggests that when preparing forecasts for attracted trips, the overlay for trips not specifically forecast by the detailed analysis of key flows will need to be higher for trips attracted to the station than those generated by the station.

6.22 However, analysis of demand at Chandlers Ford station (which is categorised as a residential station) shows the importance of understanding the market for rail travel. A brief assessment of rail travel to and from Chandlers Ford might result in the assumption that demand will be heavily concentrated on the flow to Southampton. However, analysis of passenger demand shows that whilst Southampton is the Top flow for both trips produced by and attracted to Chandlers Ford, it only accounts for 45% of trips produced and 30% of trips attracted. Indeed for forecasts of trips produced would need to consider at least the Top 5 flows (including Winchester if London BR and Travelcard is counted as one flow) if they are to be robust. The review of the Chandlers Ford demand forecasting report identified that forecasts had actually been prepared based on demand produced by and attracted to Chandlers Ford on Southampton, Eastleigh and Romsey flows. This indicates that demand for Chandlers Ford was at risk of under-forecasting demand (although in practice demand was slightly over forecast).

FIGURE 6.2 ANALYSIS OF TRIPS PRODUCED BY AND ATTRACTED TO CHANDLERS FORD

Chandlers Ford

Producer Journeys

Rank	Destination Code	Destination	Total	%
	Top Destination			
1	SOU	Southampton Cent	71,950	44.44%
	Top 3 Destinations			
1	SOU	Southampton Cent	71,950	44.44%
2	ESL	Eastleigh	22,313	13.78%
3	ROM	Romsey	9,128	5.64%
				63.85%
	Top 5			
1	SOU	Southampton Cent	71,950	44.44%
2	ESL	Eastleigh	22,313	13.78%
3	ROM	Romsey	9,128	5.64%
4	XZA	London Travelcard	7,962	4.92%
5	XLD	London BR	6,773	4.18%
				72.96%
	Top 10 Destinations			
1	SOU	Southampton Cent	71,950	44.44%
2	ESL	Eastleigh	22,313	13.78%
3	ROM	Romsey	9,128	5.64%
4	XZA	London Travelcard	7,962	4.92%
5	XLD	London BR	6,773	4.18%
6	WIN	Winchester	5,220	3.22%
7	PMS	Portsmouth & S	3,205	1.98%
8	SOA	Southampton Airp	2,935	1.81%
9	SAL	Salisbury	2,765	1.71%
10	BSK	Basingstoke	2,686	1.66%
				83.34%

Attractor Journeys

Rank	Origin Code	Origin Station	Total	%
	Top Origin			
1	SOU	Southampton Cent	22,710	30.57%
	Top 3 Origins			
1	SOU	Southampton Cent	22,710	30.57%
2	ESL	Eastleigh	15,547	20.93%
3	SDN	St Denys	6,128	8.25%
				59.74%
	Top 5 Origins			
1	SOU	Southampton Cent	22,710	30.57%
2	ESL	Eastleigh	15,547	20.93%
3	SDN	St Denys	6,128	8.25%
4	ROM	Romsey	5,095	6.86%
5	FRM	Fareham	1,706	2.30%
				68.89%
	Top 10 Origins			
1	SOU	Southampton Cent	22,710	30.57%
2	ESL	Eastleigh	15,547	20.93%
3	SDN	St Denys	6,128	8.25%
4	ROM	Romsey	5,095	6.86%
5	FRM	Fareham	1,706	2.30%
6	SOA	Southampton Airp	1,569	2.11%
7	WIN	Winchester	1,553	2.09%
8	SWG	Swaythling	1,510	2.03%
9	HDE	Hedge End	1,478	1.99%
10	XLD	London BR	1,403	1.89%
				79.01%

Summary of Concentration of Trips Produced by and Attracted to New Stations

6.23 Trips "Produced" by the new stations are fairly "concentrated" in terms of their destinations. Figure 6.3 shows that:

- The Top destination accounts for between 45% - 90% of demand
- The Top 3 destinations account for more than 60% of total demand
- The Top 10 destinations account for more than 80% of demand

And there is no apparent pattern of concentration according to category of station.

6.24 Table 6.4 shows that trips "attracted to" the new stations are more widely spread in terms of their home stations:

- The Top destination accounts for between 15% - 60% of demand
- The Top 3 destinations account for between 25% - 95% total demand
- The Top 10 destinations account for more than 50% - 98% of demand

6.25 Again there is no apparent pattern in terms of the categorisation of trips, however the analysis is possibly constrained due to the very limited number of stations categorised as "destination only" stations.

FIGURE 6.3 TRIPS PRODUCED BY NEW STATIONS: PROPORTION ACCOUNTED FOR BY KEY FLOWS

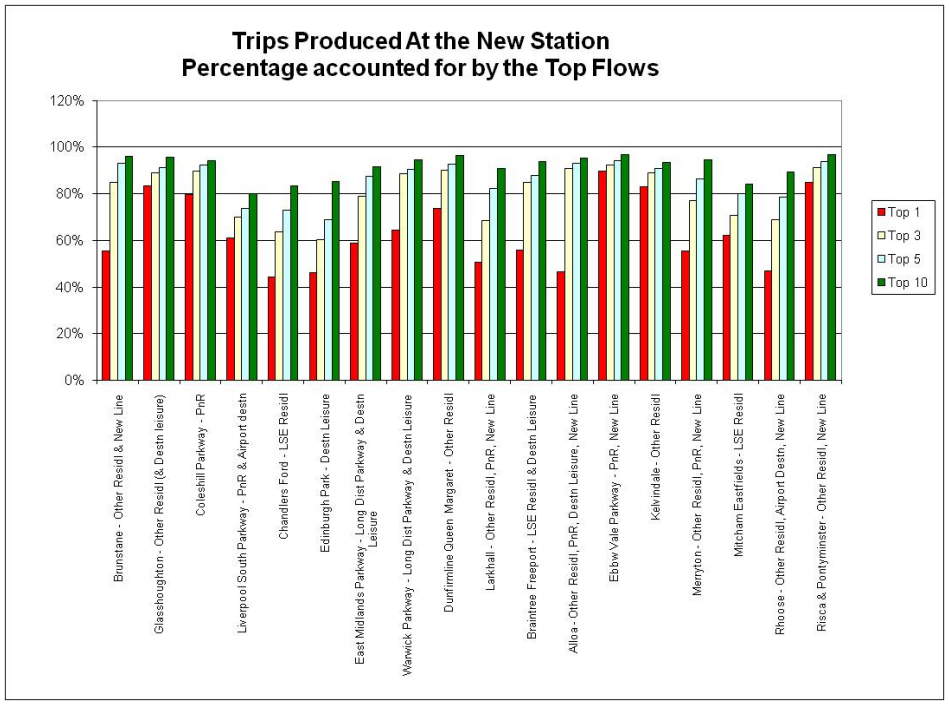
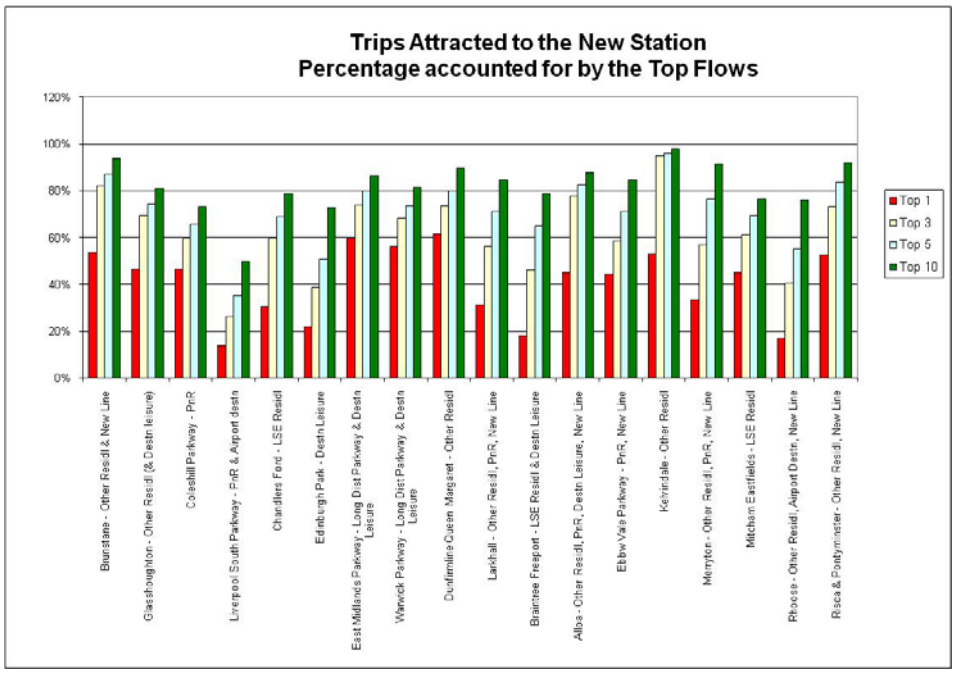


FIGURE 6.4 TRIPS ATTRACTED BY NEW STATIONS: PROPORTION ACCOUNTED FOR BY KEY FLOWS



Conclusions and Recommendations

6.26 The analysis of trips produced by and attracted to stations shows that developing an accurate understanding of the likely market for rail travel at the proposed station is a critical element in preparing robust forecasts. The assessment will need to consider trips produced by the station and attracted by the station separately and ensure that they key flows for each of these are forecast.

6.27 Even when very high level forecasts of demand for new stations are prepared it is essential that the promoter considers whether the station serves key employment or leisure opportunities and even if the main market is to serve residential housing nearby and forecasting focuses on this, a suitable overlay should be included in the forecasts.

7 Analysis of the Significance of Factors in Trip Rate Comparisons

Introduction

7.1 Applying a trip rate approach to forecasting the demand for new stations is commonly used, however due to the variety of explanatory variables used in each of the studies it was not possible to compare or benchmark trip rates across studies. In order to understand the extent to which the inclusion of different variables in the methodology would have on the trip rate an independent assessment was undertaken.

7.2 Estimates of trip rates for all new stations which have opened since 1999 were prepared, using a sequential process of adding a series of explanatory variables:

- Population
- Presence of a station car park
- Proximity of other stations
- Socio-economic characteristics
- Removing the restriction which assumes that people living beyond 5km from the station would not use the station (particularly relevant for Parkway stations).

7.3 The resulting trip rates were then compared, dis-aggregating the stations according to the categorisation of the station.

Methodology

7.4 LENNON data for 2008/9 was used as the source of actual demand, and standard software and datasets were used to calculate catchment areas, population sizes and socio-economic characteristics of the population. Station car park sizes were obtained from the National Rail Enquiries website (which it is acknowledged is not always accurate, but is the most readily available sources of this information across the network).

7.5 Trip rates were calculated for 4 catchment areas, where these are defined as concentric rings round the station based on the distance from the station:

- 0 – 1km
- 1 – 3km
- 3 – 5km
- 5km+

7.6 Rail demand was then allocated the demand for the station to each catchment area, based on a decay function (which is a function of the distance – and therefore access time to the station).

Simple Trip Rate

7.7 The trip rate was then calculated by dividing the number of journeys allocated to that catchment area by the population of that catchment area.

- For example, for Beauly the simple trip rate for the people living between 1km – 3km away from the station is 3.9 trips per head of population per annum.
- At Chandlers Ford the trip rate is 2.0 trips per head of population p/a.

Car Parks

7.8 The simple trip rate was then modified to take into account the presence of a car park (where a car park is defined as one with 10 or more spaces). If there is no car park at the station then it was assumed that the total journeys made from that station are all made by people living within 3km of the station. The journeys are therefore assumed to come from a smaller total population, and the trip rate for the 1 – 3km catchment area increases as a result. The trip rate for 0 – 1km remains unchanged, and trip rates for 3km+ are no longer relevant.

- For the Beauly example, where there is no car park, the trip rate for 1 – 3km increases from 3.9 to 6.6.
- Yet at Chandlers Ford (where there is a sizeable car park), the trip rate is unchanged from the simple trip rate of 2.0 trips per head per annum.

Voronoi

7.9 This trip rate takes into account the presence (or not) of other stations in the catchment area. These stations are considered competitors to the station in question (irrespective of the train service at the other stations) – and the catchment area of the new station is reduced. In simple terms, a line is drawn equidistant between the new station and the other stations, with the population falling outside the line being assumed to use the other station. This usually has the effect of reducing the catchment area into a corridor within the original catchment circles. Because the catchment areas have been reduced the trip rates increase.

- At Beauly the trip rate for 1 – 3km increases from 6.6 to 6.9 because some of the catchment is served by Muir of Ord.
- For the Chandlers Ford example the trip rate increases from 2.0 trips per head p/a to 4.0 trips per head p/a, as the population in the 1 – 3km catchment area are also served by Eastleigh, Romsey and Southampton Airport Parkway.

Travelstyle

7.10 This analysis considered the impact of the demographic and travel characteristics of the population, and effectively (in our analysis) normalises for the fact that some populations are more likely to travel by train than others.

- For example, the Chandlers Ford trip rate (taking into account all variables discussed and Travelstyle) reduces to 3.4 trips per head of population (from 4.0).

- This means that if the population in the Chandlers Ford catchment was more "typical" the trip rate would be lower. Implicitly therefore the population in the Chandlers Ford catchment has a higher propensity than average to travel by train and if this was not taken into account the forecast would under-estimate demand.

20km Limit on Catchment Area

7.11 This analysis considers the effect of assuming that people living beyond 5km from the station may use the station. Effectively this increases the population which make the journeys from the station and therefore reduces trip rates for the catchment areas in the 0 – 5km catchment area. The extent of this impact is dependent on the population living between 5 and 20km from the station: the larger this population, the greater the impact.

7.12 This is particularly relevant where the station is a long distance parkway station – for example Warwick Parkway. At Warwick Parkway the extension of the catchment area has the effect of reducing the trip rate for 1 – 3km catchment from 31.6 to 26.9. Similarly at East Midlands Parkway it reduces the 1 – 3km trip rate from 4.9 to 1.3 trips per head p/a.

Analysis of Resulting Trip Rates

7.13 The trip rate analysis results in a considerable volume of data. To illustrate the point that trip rates vary considerably according to local characteristics the analysis of the results focussed on the trip rates for the 1 – 3km catchment area (which typically accounts for the greatest proportion of station users).

7.14 Figure 7.1 shows the extent of the variation in trip rates for stations which are categorised as Residential stations. From this it is clear that bench-marking trip rates for new stations is inappropriate, as even when "local factors" such as presence of alternative stations and the socio-demographics of the population are taken into account there is no convergence in trip rates.

7.15 Only stations on the Ebbw Valley Line (Llanhilleth, Crosskeys, Newbridge, Risca and Rogerstone) show any similarity in terms of trip rates, but even these stations, in a fairly geographically isolated area, have different trip rates (as shown in Table 7.1) which would have a very significant impact on demand forecasts. Transport Scotland have advised that one of the reasons for Dunfermline Queen Margaret station having a high trip rate may be because it is partly a destination station, with Queen Mary hospital being located nearby.

FIGURE 7.1 COMPARISON OF TRIP RATES FOR RESIDENTIAL STATIONS

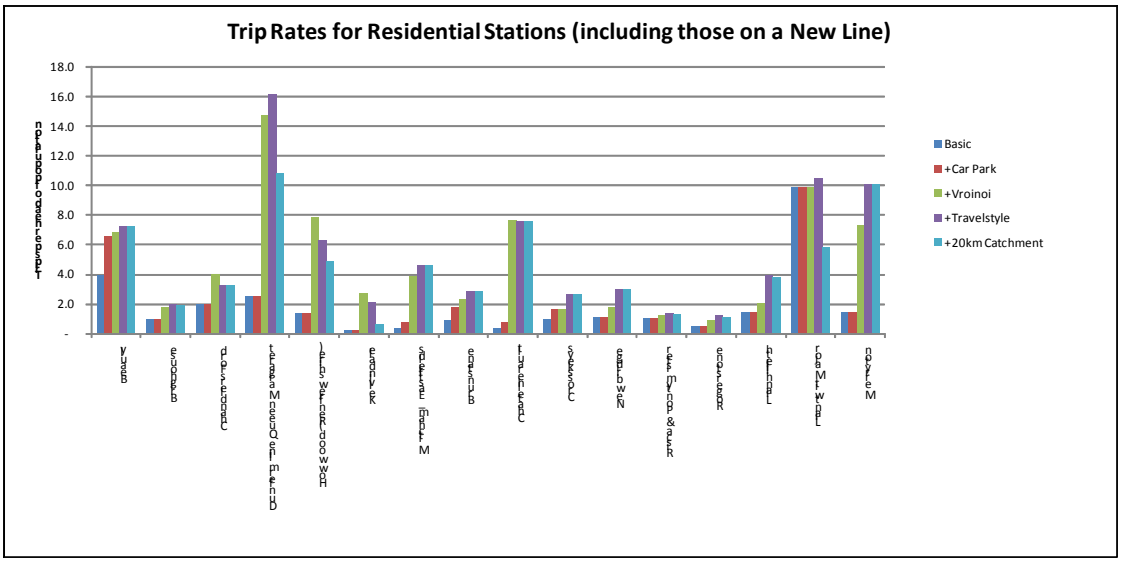


TABLE 7.1 COMPARISON OF TRIP RATES FOR RESIDENTIAL STATIONS

Station Name	Basic	+Car Park	+Vroinoi	+Travelstyle	+20km Catchment
Beauly	3.9	6.6	6.9	7.3	7.3
Brighouse	1.0	1.0	1.8	2.0	2.0
Chandlers Ford	2.0	2.0	4.0	3.4	3.3
Dunfermline Queen Margaret	2.6	2.6	14.7	16.2	10.8
Howwood (Renfrewshire)	1.4	1.4	7.9	6.3	4.9
Kelvindale	0.2	0.2	2.8	2.1	0.6
Mitcham_Eastfields	0.4	0.8	3.8	4.6	4.6
Brunstane	0.9	1.8	2.3	2.9	2.9
Chatelherault	0.3	0.8	7.7	7.6	7.6
Crosskeys	1.0	1.7	1.7	2.7	2.7
Newbridge	1.1	1.1	1.8	3.0	3.0
Risca & Pontymister	1.0	1.0	1.3	1.4	1.3
Rogerstone	0.5	0.5	0.9	1.3	1.1
Llanhilleth	1.5	1.5	2.1	3.9	3.8
Llantwit Major	9.9	9.9	9.9	10.6	5.8
Merryton	1.4	1.4	7.3	10.1	10.1

7.16 Figures 7.2 and 7.3 show the trip rates for other categories of station, with Figure 7.2 focussing on those stations which are Parkway or Park and Ride stations. Again, there is considerable variation in the trip rates, and the impact of the inclusion of different variables on the trip rate. Figure 7.2 shows that modelling the effect of local stations on the new station catchment area has a major impact on most stations, the exception being Laurencekirk where the nearest station is over 10km away.

FIGURE 7.2 COMPARISON OF TRIP RATES FOR PARK AND RIDE AND PARKWAY STATIONS

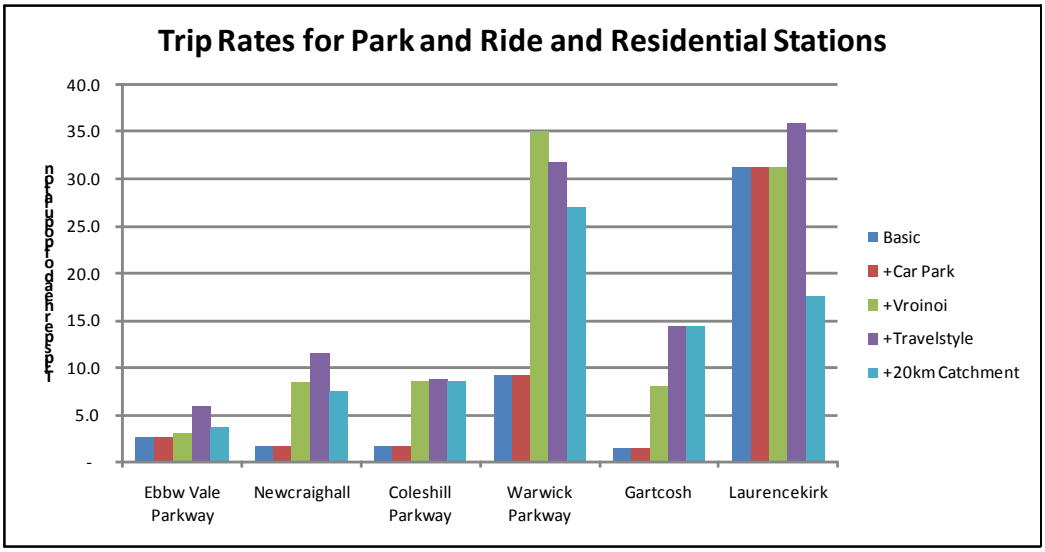
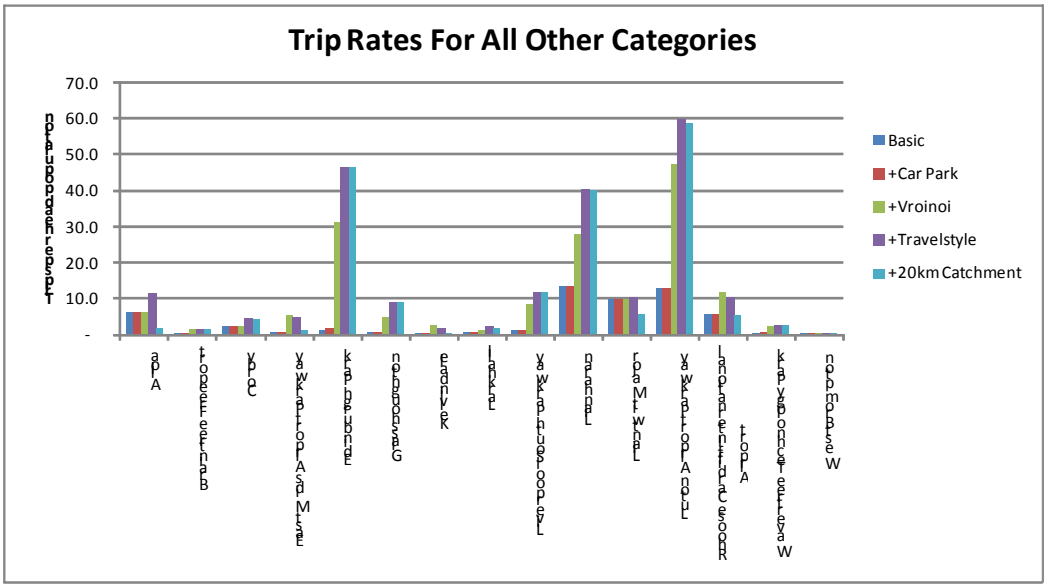


FIGURE 7.3 COMPARISON OF TRIP RATES FOR OTHER STATIONS



Conclusions and Recommendations

7.17 The independent calculation of trip rates based on actual demand and a sequential addition of explanatory variables shows that there is considerable variation in the trip rates for different stations. Whilst the trip rates for over 25 stations were considered, no obvious pattern in trip rates could be discerned.

7.18 Analysing trip rates by category of station has little effect on narrowing the range of trip rates. The analysis also shows that different explanatory variables have significant impacts on trip rates. This shows that parameters for trip rate models are not transferable across studies and places an emphasis on understanding the characteristics of the area and markets served by the station.

8 Preparation of Demand Forecasts Using a Single Model Approach

Introduction

8.1 The aim of the task reported in this chapter was to test the extent to which it might be possible to adopt a standardised methodology for forecasting demand at a range of different stations, versus the need to use a bespoke methodology in each case because the difference between individual stations is just too great.

8.2 The methodology used was based on model which incorporates the findings presented in the previous chapter which identified those factors which, as a minimum, a standard model needs to take into account. This task therefore aimed at testing the extent to which, by incorporating these factors, accurate forecasts can be made in a range of situations, and the extent to which other influences also need to be considered

8.3 To test this model (which is described in the following section), forecasts were made for seven new stations, with the results of the forecasts compared with the actual demand at these new stations. The stations included in this analysis were:

- Chandlers Ford
- Mitcham Eastfields
- Larkhall, Merryton and Chatelherault (Larkhall – Milgavie line)
- Newbridge
- Edinburgh Park

8.4 These stations were selected to include as broad a mix as possible of different types of new station. They therefore vary in terms of their location, both in terms of the region and urban v suburban v rural area served, the mix of producer v attractor trips expected (Edinburgh Park in particular was selected as a trip attractor / destination station), and whether the new station was part of a new line with a number of stations, or a stand alone new station.

Methodology

8.5 The model used for the forecasts can be described as a 'catchment model', in that it is based on the concept of identifying the area from where the station can be expected to draw its demand from, and analysing this area in terms of the people that live there, and the rail service options these people have. The model explicitly takes into account the following factors known to influence demand for rail travel:

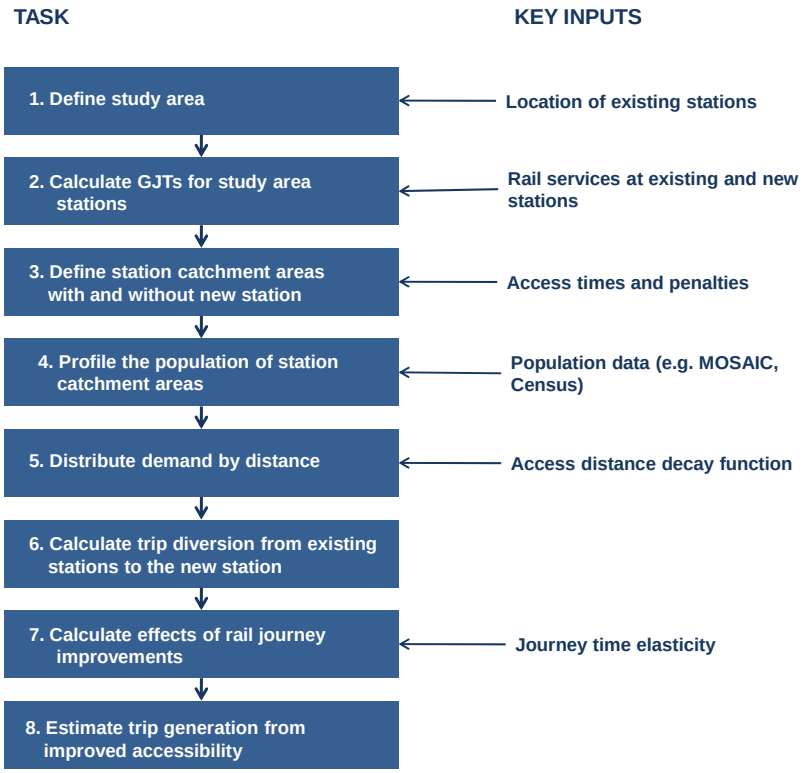
- The presence of existing stations which may compete for demand with the new station
- The quality of the rail service at existing and new stations

- The accessibility (by car) of existing and new stations, including availability of car parking
- The characteristics of the population living within the catchment area
- The spatial distribution of the population within the catchment area (which is particularly important when considering the number of people living within walking distance of the new station).

8.6 The model also explicitly separates demand transferred from one station to another versus demand generated by the new station (either through access benefits or rail service benefits).

8.7 The process the model uses can be simplified as a series of steps (outlined below and illustrated in Figure 8.1), though it is worth bearing in mind that in practice some of these processes work together rather than strictly in sequence. This process is also subsequently illustrated using the example of Chandlers Ford.

FIGURE 8.1 FORECASTING PROCESS OVERVIEW



1. Define study area

8.8 The study area is defined as all those stations that could potential be affected by the new station. For park and ride stations this could be any station within up to 30km of the new station. However, for local stations without a car park, this could be any station within up to 5km of the new station.

8.9 Note that for creating station catchments, a wider study area is used which includes a core study area plus a boundary area. This is needed to create an outer boundary further than the study area stations, to ensure catchment areas for study area stations are modelled accurately.

2. Calculate GJTs for study area stations

8.10 Generalised Journey Times (GJTs) are used as a measure of the rail service quality and can be obtained from MOIRA, or calculated manually from the timetable using PDFH values.

8.11 As a minimum, these need to be calculated for the top destination being served by the new station, and in some cases more than one destination may need to be used and the calculations of trip abstraction and generation undertaken for more than one destination.

3. Define current station catchment areas

8.12 This task aims first of all to model the current situation without the new station, by allocating people living within the study area to the station they are most likely to use based on rail service quality (GJTs), and access time. For this study we used a bespoke tool developed for the Mapinfo GIS software programme, but the same result can be achieved by other methods.

8.13 To create a consistent and continuous coverage of the study area, the study area is divided up using a tessellating coverage of small hexagons (for this study they are 500m in diameter). These hexagons are referred to as hexcells and provide a standardised geography for demand forecasting.

8.14 The generalised rail plus access time from every hexcell via every station in the catchment area, by foot and by car (for stations with a car park) is then calculated. Each hexcell is then allocated to the station giving the shortest generalised rail plus access time. Clearly this does involve a degree of simplification because people living within a hexcell may not all use the same station.

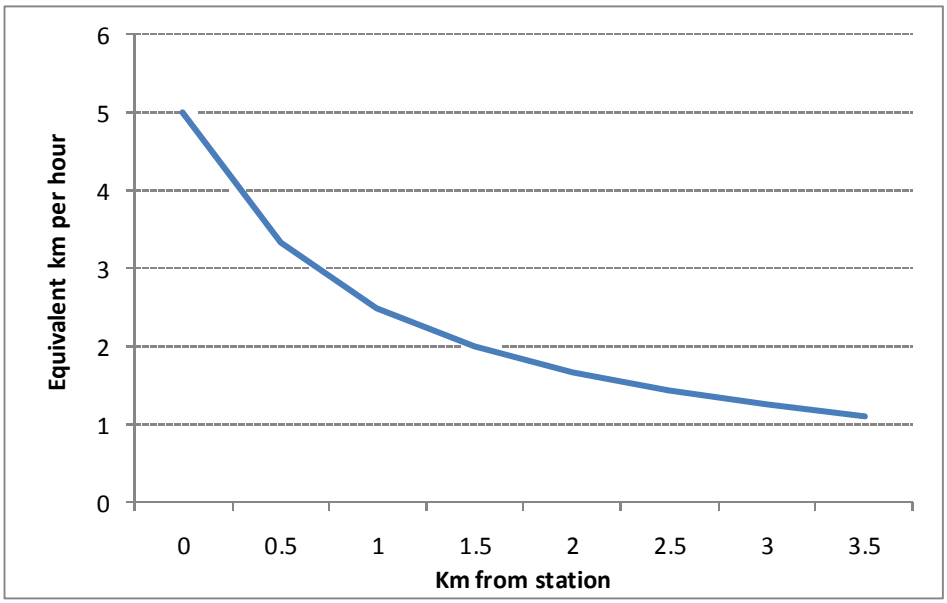
8.15 We included within this process standard penalties for access time which we have developed based on revealed preference data (most notably LATS[1]). The weights applied to the access times depend on the mode being used, and (for car) factors such as congestion, parking time and cost.

8.16 Typical penalties for car trips are: a 35 minute fixed penalty, plus a multiplier of between 2.5 and 4.0 on the normal (uncongested) travel time.

8.17 For walking, a speed of 5 Kph is assumed, and there is a walk distance penalty which increases with distance (see Figure 8.2), and also a distance cut-off (maximum), typically of 3km.

[1] LATS- London Area Transport Surveys (2001) – this survey has now been superceded by the NRTS (National Rail Travel Survey)

FIGURE 8.2 WALK ACCESS PENALTY



Note: this penalty function means that, for example, while passenger living within 100m of the station have a walk speed of 5kph, this falls to an equivalent of 2kph at 1km from the station.

8.18 Each station's catchment is then subdivided into 1km bands, or, for simplicity, 0-1km, 1-3km, 3-5km and >5km bands. These sub-divisions are used later on to calculate trip generation.

8.19 Once the current situation has been modelled (and if possible, validated) the same process is undertaken but with the new station included.

4. Profile the population of station catchment areas

8.20 The population living in each station's catchment area is profiled using the MOSAIC-based profiling system which we have developed, called "TravelStyle". TravelStyle segments the population into six groups, each with a distinct lifestyle and travel behaviour, including different propensities to travel by rail and use each access mode.

8.21 Each TravelStyle segment has a Rail Travel Index which is used to establish a weighting factor for the population of each station catchment area. The weighted population provides a measure of the rail travel potential of the station catchment, taking into account the fact that some types of people are more likely to make rail trips than others.

8.22 Also calculated is the TravelStyle Index for each station which is the average weight for the population of a station's catchment and is a measure of whether the station's population is above or below average in terms of its potential for travelling by rail.

8.23 An alternative method for taking into account population profile is to use Census data at Output Area level and to make some assumptions about how rail use differs between different demographic groups.

5. Distribute demand by distance band

8.24 This involves applying an 'Access Distance Decay function' to the population to take into account how near they are to the station. The effect of this is to increase the demand from close to the station, and decrease it from further away.

8.25 The Access Distance Decay function used is shown in Figure 8.7, and has been derived from revealed preference data from the London & South East Area[2].

6. Calculate trip diversion from existing stations to the new station

8.26 Trip diversion is calculated by comparing the 'before' and 'after' station catchments and identifying those hexcells (and the population within them) which switch catchment areas.

7. Calculate effects of rail journey improvements

8.27 The effects of any changes to the rail services resulting from the new station are calculated using a PDFH formula based on GJT changes.

8.28 This is then used to provide an estimate of the trip generation effects of rail service improvements.

8. Estimate trip generation from improved accessibility

8.29 Trip generation from improved access is estimated by calculating the effects of the Access Distance Decay Function with and without the new station.

8.30 The difference in the populations weighted by the Access Distance Decay Function is a measure of the impact on trips. The generation is calculated as a % of the trip diversion figure.

Worked example: Chandlers Ford

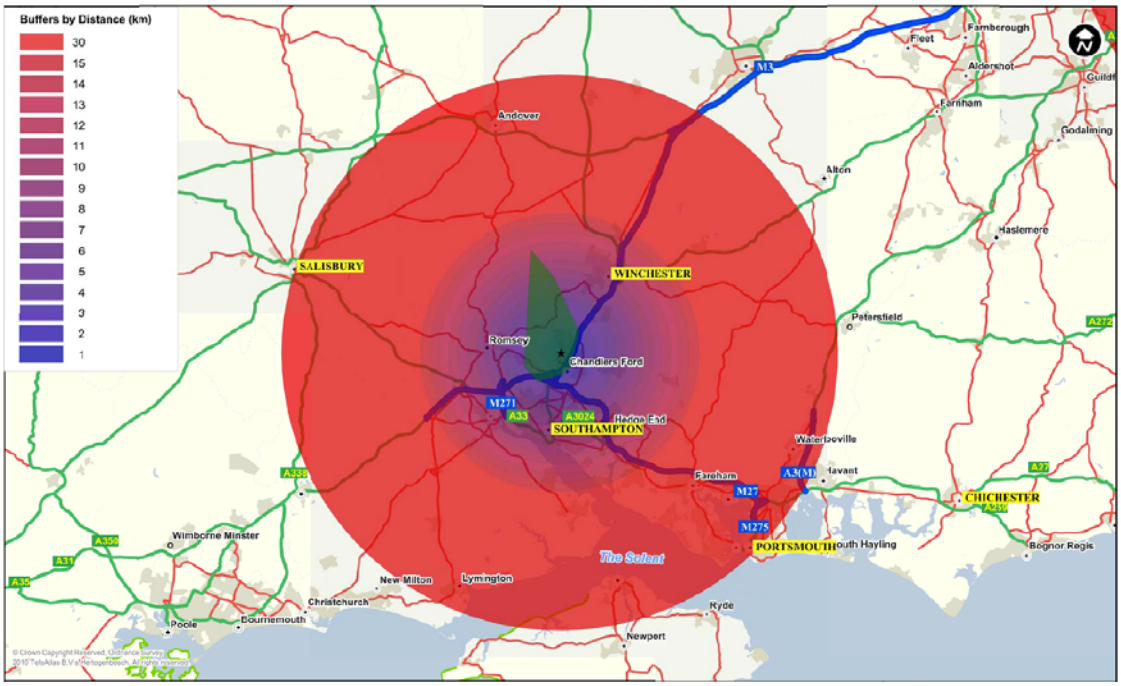
8.31 To illustrate the steps described above we take one of the case study stations used for this analysis, Chandlers Ford.

1. Define study area

8.32 Chandlers Ford has a car park, so theoretically, it could be used by anyone within a reasonable drive of the station, which we have taken to be 30km maximum (illustrated in Figure 8.3).

[2] LATS (2001)

FIGURE 8.3 CHANDLERS FORD 30KM BUFFER AREA



2. Calculate GJTs for study area stations

8.33 Generalised Journey Times were obtained for stations in this study area for travel to London and Southampton. The Southampton GJTs are shown in Table 8.1, for the core study area stations (that is, excluding those on the boundary which were used purely to define a realistic limit to the study area being analysed).

TABLE 8.1 GENERALISED RAIL JOURNEY TIMES TO SOUTHAMPTON

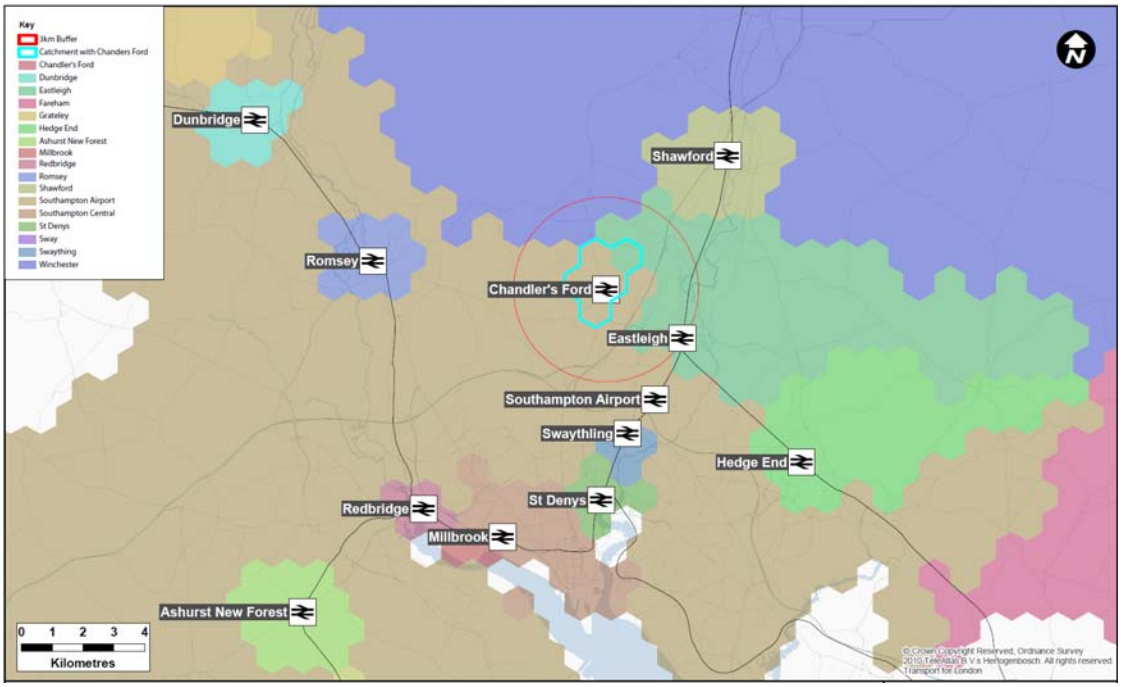
Station	GJT (minutes) to Southampton
Hedge End	50.2
Southampton Airport Parkway	25.6
Eastleigh	33
Chandlers Ford	52.5
Ashurst New Forest	36
Redbridge	46
Millbrook	43.5
St Denys	21.6
Swaythling	34
Dunbridge	60
Romsey	30.6
Shawford	52
Beaulieu Road	53

3. Define current station catchment areas

8.34 The station catchment areas are shown in Figure 8.4 below. The layer of hexcells is evident, and it can be seen that each hexcell has been allocated to one station, with this station being determined by the home to Southampton generalised travel time (that is, including the access penalties described earlier as well as the GJTs shown in Table 8.2).

8.35 The Chandlers Ford catchment is overlaid onto the catchments of the existing stations and from this it can be seen that the new station mainly captures demand from Southampton Airport Parkway, though also some from Eastleigh. It is also apparent that it is capturing demand from passengers who can walk to the station.

FIGURE 8.4 CHANDLERS FORD CATCHMENT AREA



4. Profile the population of station catchment areas

8.36 The output of the station catchment modelling process is shown in Figure 8.5 which shows the populations of each station catchment (and access distance sub-catchments), with and without Chandlers Ford, weighted by TravelStyle to take into account the profile of the population as well as the number of people.

FIGURE 8.5 TRAVELSTYLE WEIGHTED POPULATIONS OF STUDY AREA STATIONS

	2a) Weighted population without new station			2b) Weighted population with new station		
	0-1km	1-3km	3+km	0-1km	1-3km	3+km
Chandlers Ford	0	0	0	10038	11342	679
Dunbridge	234	669	0	234	669	0
Eastleigh	9209	18168	14187	9209	18168	11048
Hedge End	5597	5501	4096	5597	5501	4096
Ashurst New Forest	942	1427	0	942	1427	0
Redbridge	5671	12600	0	5671	12600	0
Romsey	8959	9048	0	8959	9048	0
Shawford	1344	2791	0	1344	2791	0
Southampton Airport (Parkway)	936	17248	184317	936	16899	163424
Southampton Central	0	0	0	0	0	0
St.Denys	16012	34573	0	16012	34573	0
Swaythling	9959	10089	0	9959	10089	0
Total	58863	112114	202600	68901	123107	179247

Note: Southampton Central has no catchment area in this instance because it is the destination station

5. Distribute demand by distance band

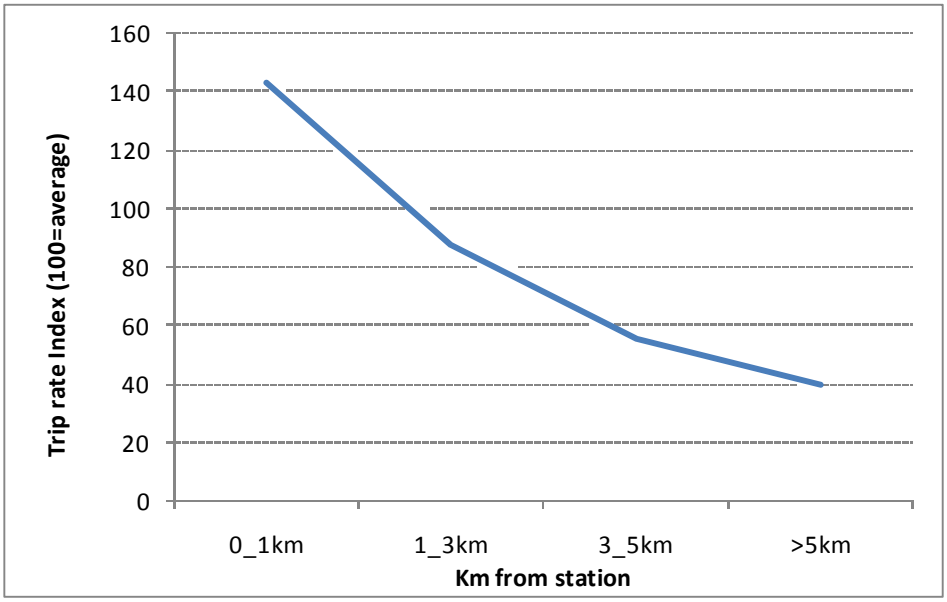
8.37 In Figure 8.6 we show the same data as in Figure 8.5 but weighted using the Access Distance Decay Function. It can be seen that the effect of this is to increase the population living nearer to the station, and reduce it living further away. The weighted population figures can be interpreted as the relative potential for rail trip making within each of the station and distance catchment areas. So, for example, the weighted population figure of 15,988 for the Eastleigh 1-3km catchment is twice that of the Hedge End 0-1km catchment (8,004) meaning that we would expect twice the number of trips to be generated from the Eastleigh 1-3km catchment as the Hedge End 0-1km catchment.

8.38 Since we know the number of trips currently at each station, this weighted population information can be used to distribute this demand across the station and distance catchment areas, hence giving an estimate of the number of rail trips originating from each.

FIGURE 8.6 POPULATION WEIGHTED BY TRAVELSTYLE AND ACCESS DISTANCE

	5a) Weighted population without new station			5b) Weighted population with new station		
	0-1km	1-3km	3+km	0-1km	1-3km	3+km
Chandlers Ford	-	-	-	14,354	9,981	380
Dunbridge	335	589	-	335	589	-
Eastleigh	13,169	15,988	7,945	13,169	15,988	6,187
Hedge End	8,004	4,841	2,294	8,004	4,841	2,294
Ashurst New Forest	1,347	1,256	-	1,347	1,256	-
Redbridge	8,110	11,088	-	8,110	11,088	-
Romsey	12,811	7,962	-	12,811	7,962	-
Shawford	1,922	2,456	-	1,922	2,456	-
Southampton Airport (Parkway)	1,338	15,178	103,218	1,338	14,871	91,517
Southampton Central	-	-	-	-	-	-
St.Denys	22,897	30,424	-	22,897	30,424	-
Swaythling	14,241	8,878	-	14,241	8,878	-
Total	84,174	98,660	113,456	98,528	108,334	100,378
Access distance weighting factor	*1.43*	*0.88*	*0.56*	*1.43*	*0.88*	*0.56*

FIGURE 8.7 STATION ACCESS DISTANCE DECAY FUNCTION



6. Calculate trip diversion from existing stations to the new station

8.39 Trip diversion is calculated by comparing the weighted populations with and without Chandlers Ford, then converting this from population to trips. This process is shown in Figure 8.8. There are three steps shown: (a) shows the difference in the weighted populations with and without Chandlers Ford; (b) shows this as a percentage of the total weighted population for each station; and (c) shows these percentages applied to the known number of trips at each station.

8.40 For example, we can see that 1,758 weighted population is "diverted" from the Eastleigh 3+km catchment to Chandlers Ford, and that this is equivalent to 4.7% of the total weighted population of Eastleigh. Applying this percentage to the existing rail demand at Eastleigh (from ORR station use data), gives 68,480 trips diverted from Eastleigh to Chandlers Ford.

8.41 The figure also shows that the total forecast diversion is 214,963 trips.

FIGURE 8.8 TRIP DIVERSION CALCULATIONS

	6a) Difference in access distance weighted populations			6b) Diverted trips as share of total			6c) Number of diverted trips			
	0-1km	1-3km	3+km	0-1km	1-3km	3+km	0-1km	1-3km	3+km	Total
Chandlers Ford	14,354	9,981	380				-	-	-	-
Dunbridge	-	-	-	0.0%	0.0%	0.0%	-	-	-	-
Eastleigh	-	-	(1,758)	0.0%	0.0%	-4.7%	-	-	(68,480.4)	- 68,480
Hedge End	-	-	-	0.0%	0.0%	0.0%	-	-	-	-
Ashurst New Forest	-	-	-	0.0%	0.0%	0.0%	-	-	-	-
Redbridge	-	-	-	0.0%	0.0%	0.0%	-	-	-	-
Romsey	-	-	-	0.0%	0.0%	0.0%	-	-	-	-
Shawford	-	-	-	0.0%	0.0%	0.0%	-	-	-	-
Southampton Airport (Parkway)	-	(307)	(11,700)	0.0%	-0.3%	-9.8%	-	(3,746.7)	(142,736.1)	- 146,483
Southampton Central	-	-	-	0.0%	0.0%	0.0%	-	-	-	-
St.Denys	-	-	-	0.0%	0.0%	0.0%	-	-	-	-
Swaythling	-	-	-	0.0%	0.0%	0.0%	-	-	-	-
Total							-	- 3,747	- 211,217	- 214,963

7. Calculate effects of rail journey improvements

8.42 The rail service at Chandlers Ford is actually less attractive than its neighbouring stations. Referring back to Table 8.1 we can see that the GJT for Chandlers Ford is 52.5 minutes while at Eastleigh it is 33 minutes. This means that the GJT adjustment is a negative one in this instance.

8.43 The calculations for Chandlers Ford are illustrated in Figure 8.7. Note that the calculations are based on a standard PDFH journey time elasticity of -0.9.

8.44 The overall effect of this adjustment is to reduce demand by 124,261 trips.

FIGURE 8.9 RAIL SERVICE QUALITY ADJUSTMENT

	9) GJT (to Southampton)	Adjustment	Adjusted diversion
Chandlers Ford	52.5		
Dunbridge			
Eastleigh	33	0.66	- 45,091
Hedge End			
Ashurst New Forest			
Redbridge			
Romsey	31	0.62	-
Shawford			
Southampton Airport (Parkway)	27	0.54	- 79,171
Southampton Central			
St.Denys			
Swaythling			
Total			- 124,261

8. Estimate trip generation from improved accessibility

8.45 The final step is to calculate the effects of improved access on trip generation. The basic principle is that a new station will make it easier for people living near the new station to travel by rail and as a result they will make more trips. This is particularly the case if they can walk to the new station: this effect is what is picked up by the Access Distance Decay Function illustrated earlier in Figure 8.7.

8.46 The calculation of trip generation is done by comparing the weighted population (that is, weighted for population profile and access distance to the station) in the new Station's catchment area with the weighted population of those switching from the existing stations. The difference between the two figures represents the access benefit from switching from the existing to the new station.

8.47 In the case of Chandlers Ford, the weighted population of its catchment area is 24,715 (14,354 + 9,981 + 380 from Figure 8.8), while the weighted population of those diverted from existing stations is only 14k (1,800 + 11,700 from Figure 8.8), the difference (+80%) being the access benefit of switching to Chandlers Ford, which then results in extra trips being made. This access benefit of +80% is then applied to the number trips diverted to Chandlers Ford.

8.48 The key data are shown in Figure 8.10 below, with this Figure showing that the access benefit of 80%, when applied to the trip diversion figure, translates to an extra 98,854 generated trips on top of the 124,261 diverted trips.

FIGURE 8.10 TRIP GENERATION CALCULATIONS

	Trips	10) Weighted population (profile and access) for those switching			Trips
	Trip diversion	To new station	From existing stations	% Difference (access benefit)	Generation
Chandlers Ford	124,261	24,716	13,765	80%	98,854

8.49 The final Figure for Chandlers Ford is the overall result and comparison against the actual demand. The model predicts 223,115 trips (44% of which are generated), compared with an actual of 236,102. Therefore in reality a 6% more trips were realised than estimated in the modelling exercise.

FIGURE 8.11 CHANDLERS FORD RESULT

Total	Of which trip generation	Of which service benefits	Actual	Difference	% Difference
223,115	44%	0%	236,102	12,987	6%

Demand Forecasts

8.50 The results for all five case studies are shown in Figure 8.12. Three of the five case studies returned forecasts within 6% of the actual. The Larkhall – Chatelherault forecast was less accurate with the model over-estimating demand by 21%. There are a number of possible explanations for this but we consider that the most likely reason is that the model over-states the access benefits because in this case it is based on parameters derived from London & South East which may not apply in this area.

8.51 The final example is Edinburgh Park which the model failed to forecast. In fact, this should not be a surprise because the model is based on estimating demand originating from the station catchment area, whereas most of the demand (79%) is destined for (or attracted to) the station. This highlights the point that a different method is needed for forecasting demand for this type of station, perhaps based on a trip generation model as used for estimating car trips generated by a new development.

FIGURE 8.12 SUMMARY OF DEMAND FORECASTS USING SINGLE MODEL APPROACH

Station	Total forecast demand from catchment area	Of which generated from access benefits	Of which generated from service improvements	Actual demand	Difference (forecast-actual)	% difference
Chandlers Ford	223,115	44%	0%	236,102	12,987	6%
Mitcham Eastfields	210,778	20%	9%	199,132	- 11,646	-6%
Larkhall-Chatelherault	602,394	62%	7%	474,902	- 127,492	-21%
Newbridge	122,462	45%	0%	115,676	- 6,786	-6%
Edinburgh Park	47,322	24%	3%	113,163	65,841	139%

Conclusions and Recommendations

8.52 Overall, this analysis shows that:

- Any model should take into account the following, as a minimum:
  - The presence of existing stations which may compete for demand with the new station
  - The quality of the rail service at existing and new stations
  - The accessibility (by car) of existing and new stations, including availability of car parking
  - The characteristics of the population living within the catchment area
  - The spatial distribution of the population within the catchment area
- A single standard model cannot realistically be expected to cope with all situations, so there needs to be clear guidance provided as to where it is and is not appropriate. For example, two cases where our existing catchment-based model is not appropriate are stations serving a business park, and serving an airport or port. In these cases an alternative approach is needed. However, our

model is appropriate for a wide range of producer type stations including urban, rural and parkway stations.

- More work would be beneficial to be able to tailor the parameters for such a model so it can more accurately reflect local conditions. In this context, a key parameter is the Access Distance Decay Function which is key for modelling trip generation benefits. Equally important are the parameters used to model station choice and to calculate the station catchment areas. Specifically, the access time penalties including parking time, road congestion, and equivalent penalties for bus access.
- Ideally, a final step in the forecasting process would be to cross-check the implied trip rates in the forecasts against a database of existing actual trip rates, calculated in a consistent (and accurate) way. This would be a valuable sense-check of the forecasting model output.

8.53 We therefore recommend the following:

- The results of this study are disseminated widely to encourage greater consistency and accuracy in the way forecasts for new stations are undertaken.
- The National Rail Travel Survey (NRTS) is used to derive a database of parameters to be used in station forecasting models, including:
  - Station accessibility
  - Access mode
  - Population profile
  - Trip rates for existing stations of varying types and in different regions.

9 Recommended Guidance for the Preparation of Demand Forecasts for New Stations

Introduction

9.1 One of the objectives of this study was to provide inputs to a guidance document being prepared by the DfT. The intended audience for the document is promoters of new stations, with the intention being that the document will guide them in the types of issue which should be considered when preparing a submission for a new station. The guidance is not intended to be a technical document, and as such will not provide recommendations of forecasting methodologies, key parameters (e.g. trip rates) or assumptions (e.g. demand build-up) that should be used.

9.2 However, it is expected that the guidance will be helpful in informing promoters of the type of information that is required in a submission, key issues that require attention and the form in which forecasts should be presented. It should assist the promoter in understanding the level of work which is needed to meet the DfT and TS requirements. Where promoters are commissioning third parties to prepare demand forecasts on their behalf, the guidance will be valuable in terms of ensuring that the promoter can specify the scope of work and outputs required and is an "informed client".

9.3 The guidance is based on our experiences of undertaking this study, in particular the collation and review of forecasts and supporting documents and our findings in the review of the demand forecasting methodologies used.

9.4 If the guidance is followed it should result in an improvement in the quality of proposals received by DfT and TS, with the forecasts being more comprehensive in terms of the aspects of demand considered and the supporting documentation supplied. Importantly, the submissions received by DfT and TS should also be more consistent in terms of the level of information supplied and the format of the demand forecasts themselves. This will allow consistent review of submissions and greater confidence in the selection of submissions to be taken forward for funding.

Recommended Guidance

9.5 In order to fit with the wider document being prepared by the DfT, our guidance was structured under four key headings:

- Demand side
- Supply Side
- Forecasting Methodology and Presentation of KPIs
- Other Issues

9.6 The guidance takes the form of questions which the promoter should consider and ensure are adequately covered in the demand forecasts. If the guidance is followed it should improve the quality of demand forecasts and facilitate their review by funding authorities. The guidance is presented in Appendix C.

9.7 The guidance is not intended to be prescriptive in terms of the level of detail to which the forecasts are prepared, the methodology used nor the parameters employed.

9.8 Whilst primary research into the local factors which may drive demand for the new station is not a pre-requisite for preparing forecasts, where a promoter chooses to undertake research it should be encouraged as it is likely to improve the quality of the forecasts and if disseminated it should improve the quality of other demand forecasts for new stations. The following Chapter provides an overview of the type of information which would be useful to obtain in such surveys – and could be expected to result in an improvement in station forecasts.

10 Guidance on Undertaking Primary Research to Support Demand Forecasting and Post Implementation Evaluation

Introduction

10.1 The review of the demand forecasts for this study showed that in a number of cases there was insufficient evidence in the demand forecasting approach of understanding the market that the station would serve. Furthermore, rarely did the documentation of the forecasting methodology explain (with reference to the station or markets) why the chosen methodology had been selected, nor why the given values of parameters had been used. There was also a lack of evidence of "pragmatic" assumptions (based on knowledge of the local area) being used to prepare the forecasts, for example to consider the impact of socio-demographics of the local population, the competing modes and the size and utilisation of station car parks.

10.2 We would recommend that were primary research undertaken in advance of preparing demand forecasts there would be a greater probability of the forecasts being accurate. Furthermore, if there is to be a step-change in the quality of forecasts of demand for new stations it will be necessary to understand who uses the new stations and why (for example where do the users live, are they abstracted from existing stations or why do they change mode). To obtain this information it will be necessary to undertake "post-opening" surveys of people who use the station but also those living nearby who do not use the station.

10.3 Anecdotally it is recognised that forecasting demand for new stations is relatively poorly developed. This may be because of the lack of "evidence base" on which to develop a methodology. The review of demand forecasting methodologies did not identify one example where a survey had been undertaken to understand the necessary scope of the forecasting methodology and for only one station (Corby) is there any evidence of "post-opening" research.

10.4 No surveys were commissioned as part of the New Stations study, however, DfT commissioned the drafting of survey questions to assist in possible future research. This chapter provides an outline of the types of survey that should be undertaken to assist promoters and demand forecasters in preparing forecasts and also to understand the "actual" demand response to the new station.

Proposed Surveys

10.5 Table 10.1 summarises the surveys that would ideally be undertaken prior to identifying the demand forecasting methodology for a new station and after the station opened, to understand the reasons for differences between forecast and observed demand.

10.6 For both before and after surveys it is important to understand the travel choices of people who use rail and those who do not. "Before" surveys of people who use

rail should seek to understand the likely level of demand abstraction. This will allow forecasters reflect this in the demand forecasts and business case.

10.7 One of the problems in forecasting demand for new stations is that relatively little is known about journeys made by other modes by people in the catchment area and their reasons for not using rail. By understanding what factors would encourage these people to travel by rail it will be possible to confirm the likely catchment area of the new station and the potential for mode switch and trip generation.

10.8 The "after" surveys seek to provide evidence on the actual catchment area of the station and to understand how passengers who are using the new station were travelling before (i.e. if it is a new trip, a trip which was previously made by another mode or a trip which is abstracted from another railway station). This information can then be used to guide future forecasts for new stations.

TABLE 10.1 RECOMMENDED SURVEYS TO CONTRIBUTE TO NEW STATION DEMAND FORECASTING

Before Station Opens	At Home (telephone)	At station (face to face)
Before Station Opens	To understand mode switch and suppressed demand and influence how it is modelled.	Surveys at neighbouring stations. To understand the potential for abstraction of demand and influence how it is modelled.
After Station Opens	To understand why people have chosen not to use the new station. To investigate awareness and perceptions of the new station.	Surveys at the new station. To understand what proportion of demand has been abstracted and why, and whether the assumptions in the demand modelling were valid

10.9 Table 10.2 recommends the questions that should be asked in a "before" survey. The information gathered should then be used to guide the approach used to forecast demand, the parameters used and any "pragmatic adjustments" to forecasts.

10.10 Table 10.3 outlines the type of questions that would be helpful in understanding the observed demand for the new station, the extent to which abstraction had occurred and how long demand had taken to build-up at the new station. It is also likely to be helpful in explaining the sources of demand for the station (mode switch and trip generation) and the difference between forecast and observed demand.

10.11 Information gathered from these surveys should be provided to DfT and TS as it will be invaluable in improving the quality of demand forecasts for new stations in the future.

TABLE 10.2 PROPOSED SURVEY QUESTIONS FOR "BEFORE STATION" SURVEYS

Proposed "at home, before" survey questions:	Proposed "At-station, before" survey questions:

I Frequency of travelling by rail
I Which stations used
I Satisfaction with rail services in their area including:
  I Reliability, frequency, destination served, journey time, value for money, station facilities and environment, ease of getting to the stations in the area, availability of parking at the station in the area
I Reasons for not travelling by train more often
I Stated impact of improvements to rail services, including:
  I Greater frequency, shorter journey time, greater availability of car parking, improved station facilities
I Household car ownership
I Home Postcode
I Age category, Occupation category, Gender
	I Destination station
	I Purpose
	I Ticket category (incl Railcard use)
	I Access mode (if car, parked, where parked), If car, lift, whether driver travelling onto another destination
	I Party composition
	I Frequency of using station
	I Satisfaction with station and rail services from the station
	I Household car ownership
	I Home Postcode
	I Age category, Gender

TABLE 10.3 PROPOSED SURVEY QUESTIONS FOR "AFTER STATION OPENING" SURVEYS

Proposed "at home, after" survey questions:	Proposed "At-station, after" survey questions:
I Frequency of travelling by rail I Which stations used I Awareness of new station (including source of awareness) I Reasons for using/not using new station I Likelihood of using new station in the future I Users of new station I When first used station I Why started using station I What they did before the station opened (e.g. used another station, travelled by car, didn't make trip at all) I Satisfaction with rail services in their area including: I Reliability, frequency, destination served, journey time, value for money, station facilities and environment , Ease of getting to the stations in the area, Availability of parking at the station in the area I Household car ownership, occupation category I Home Postcode I Age category, Occupation category, Gender	I Destination station I Purpose I Ticket category (incl Railcard use) I Access mode, If car, parked, where parked, If car, lift, whether driver travelling onto another destination I Party composition I Frequency of using station I When first used station I Why started using station I What they did for current trip before the station opened (e.g. used another station, travelled by car, didn't make trip at all) I Satisfaction with station and rail services from the station I Household car ownership I Home Postcode

11 Conclusions and Recommendations

11.1 This report for the New Stations study draws conclusions for each element of the study and made recommendations accordingly. The variety of issues considered made it appropriate to document these conclusions and recommendations at each stage of the analysis, however this chapter summarises both the conclusions and recommendations for easy reference. These are presented in a format consistent with the structure of the analysis.

Data Collation

11.2 Whilst demand forecasts and supporting documentation was available for 27 of the 40 new stations which have opened since privatisation, original documentation (containing the details of the forecasting and assumptions) for a significant number of these was not available. Only 5 of the original forecasting demand forecasting models were available (of which 4 were originally prepared by SDG).

11.3 It was generally found that the reason for information not being readily available was due to changes in technology and organisational restructuring.

11.4 Furthermore, in a number of instances the forecasts which were provided were not in a format consistent with observed demand and therefore comparisons between forecasts and between forecasts and observed demand were not easily made.

11.5 It is recommended that promoters of new stations request demand forecasting models and accompanying information and store this electronically. They should ensure that the documentation describes the markets which the new station is anticipated to serve, the rationale for the choice of forecasting methodology and the key assumptions under-pinning the forecasts. The full scope of the documentation should be consistent with the "new station demand forecasting checklist" described in this report.

11.6 The DfT and TS should ask for demand forecasts to be presented on a consistent basis (consistent with the format defined in the new station demand forecasting checklist) and should also request copies of the demand forecasting documentation which should be stored electronically.

Demand Forecasting Methodology

11.7 The review of the demand forecasting methodologies used found that in general they were appropriate, however rarely was the rationale for the choice of approach explained. There was considerable variation in the level of detail to which forecasts were prepared and often the source of key parameters (such as trip rates) was not described.

11.8 The fairly small sample size and the considerable overlapping of station categories meant that it was not possible to draw conclusions as to a pattern of forecasting methodology chosen and type (category) of station.

11.9 Demand abstraction, demand build-up and underlying demand growth were all modelled in the majority of cases (although this could not be confirmed in some instances due to the lack of original documentation).

11.10 It is recommended that promoters of new stations are encouraged to adopt the recommendations in the new stations forecasting checklist which outline the scope of work which is necessary to prepare forecasts for submission as part of a submission for a new station. This should result in a more consistent level of detail to which forecasts are prepared. The demand forecasting documentation should reflect this scope of work and should be retained by both the promoter and DfT/TS.

11.11 Given the large number of stations opening in the last 2-3 years the effect of demand build-up at these stations is still occurring. Assessing the accuracy of demand forecasts for these stations is difficult as the forecast of final year demand (before build-up assumptions are applied) may be accurate, but forecast may appear to be inaccurate because the build-up rate experienced is different to that assumed in the forecasts (or vice versa).

11.12 The 2009/10 LENNON demand data became available after concluding the analysis for the New Stations study. We would recommend that a review of demand for new stations opened recently is undertake with this new data to understand how demand has built-up over time, and then comparing this with that assumed in the forecasts.

11.13 In collating demand forecasts and supporting documentation for this study and reviewing and attempting to compare methodologies and forecasts, a number of key conclusions and recommendations immediately became clear. There is considerable variation in the level of detail to which forecasts are prepared and documented. One conclusion that could be drawn is that the level of detail to which forecasts are prepared is dependent on the extent to which the promoter of the new station understands the complexity of forecasting demand for new stations and is willing to commission forecasts of sufficient scope. The guidance for promoters of new stations which is being prepared by DfT should help to alleviate this knowledge gap. The review of forecasts for the New Stations project has allowed us to propose recommendations for inclusion in the DfT guidance which will assist promoters when commissioning the preparation of forecasts, improve the quality of forecasts and should also allow the DfT/TS to assess and compare forecasts more easily.

Comparison of Forecast and Observed Demand

11.14 The study found that in general demand is slightly under-forecast, but not by a consistent factor. There is no evidence of demand forecasting inconsistencies by category of station. There were a number of examples where demand was very significantly different (+/-50%) to observed demand and these were due to a number of factors including:

- the outturn values of key input variables (such as housing completions) being different to that assumed in the forecasts
- the demand forecasting not taking into account the markets served by the station or key local factors

11.15 The review does not recommend that uplift factors should be applied to demand forecasts to adjust for the slight tendency to under-forecast as there is not a

consistent difference between forecast and observed demand. However it is recommended that promoters work with those preparing the demand forecasts to ensure that the sources of demand for the station and key local factors are understood and reflected in the modelling. This should reduce the risk of the forecast demand being significantly different from observed demand.

Demand Abstraction

11.16 Limited evidence of demand abstraction was found, however the analysis could only be undertaken for a small number of stations due to the limited availability of time series data. Further, a number of stations have opened so recently that it is not yet possible to detect whether abstraction has occurred.

11.17 It is recommended that it becomes standard procedure for DfT and TS download LENNON data on passenger journeys (for each 4-weekly period) at all stations opened in the previous 5 years, and their neighbouring stations (both those from which demand may be abstracted and those which should be unaffected). This process should obtain the information for the neighbouring stations for the 2-years prior to the new station opening.

11.18 It is recommended the issue of possible demand abstraction to Laurencekirk, Imperial Wharf and Corby is revisited at a later date (for example in April 2011 and April 2012) when further time series data will be available. LENNON 4-weekly passenger journeys data for the period since February 2010 should be obtained for these new stations (and their neighbouring stations, identified in Chapter 4) and combined with the data collated for this study. It should then be possible to draw conclusions as to whether abstraction has occurred at these stations. However, post-opening surveys of passenger at new stations are likely to provide the greatest insight into the extent to which demand abstraction occurs.

11.19 Despite little evidence being found of abstraction it is recommended that forecasters continue to consider it as one of the sources of demand for new stations, and reflect this in the demand modelling. In parallel the forecasts should also consider whether demand is suppressed at stations nearby (for example as a result of car parks at these stations being at capacity), as any abstraction to the new station would result in some of this suppression being released (and rail trips generated).

Demand Backcasting

11.20 Limited backcasting analysis could be undertaken for this study as a result of lack of original forecasting models being available and (to a lesser extent) because to update some would require a significant data collection exercise.

11.21 Backcasting was undertaken for two stations: Aylesbury Vale Parkway and Liverpool South Parkway. With both stations it was found that updating the model with outturn values for key demand drivers resulted in the forecasts being significantly more accurate.

11.22 Whilst backcasting alone is unlikely to be able to significantly improve the approach to forecasting demand for new stations, it is a tool which can be used to show the importance of selecting accurate input values to models and to identify in some cases, why forecast demand is different to observed demand. It is

therefore recommended that the promoters of new stations request copies of the original demand forecasting model (and supporting documentation) and store these electronically.

Producer Attractor Analysis

11.23 Whilst all stations will be "Attractor" stations for some trips, these trips will account for a significant proportion of demand at others. This highlights the importance of understanding the market for the station prior to selecting the methodology that will be used to forecast demand.

11.24 In the New Stations study it was found that an average of 48% of trips to/from stations which are categorised as Destination stations (but which may also be residential and/or Park and Ride stations) is accounted for by trips attracted to the new station. However there is considerable variation in this category: with only 23% of trips to Liverpool South Parkway being attractor trips compared to 85% at West Brompton and 70% at Shepherds Bush. For those stations which are not categorised as Destination stations an average of 27% of demand to/from these stations is accounted for by trips attracted to the new stations (ranging from 10% at Aylesbury Vale Parkway to 63% at Beauly).

11.25 It should be noted however that this analysis will be affected by how tickets are purchased: for example passengers often find it more convenient to purchase season tickets at a station other than their home station (usually at their destination station) and on regional routes many return journeys are made by purchasing two single tickets.

11.26 In general it was found that insufficient attention was paid to trips which were attracted to the new station, in particular where it was a destination station. This may be one of the reasons for demand being slightly under-forecast.

11.27 The conclusions of this analysis supports our recommendations that promoters and forecasters need to consider the all the different sources of demand for the new station, and ensure that they are adequately covered in the demand forecasts.

11.28 The analysis of Producer Attractor trips also considered the "concentration" of demand on key flows. It was found that in general 75% - 90% of trips produced by the new station were on the Top 5 flows. However for trips attracted to the new station only 30% - 50% were on the Top 5 flows. Often the key flows were not the same for producer and attractor trips.

11.29 These findings show that it is not sufficient to forecast demand on the basis of a single destination station. Forecasters must consider alternative destinations (and origins of demand with the new station as the attractor station) and consider the extent to which they will contribute to demand for the new station. Whilst it would be unreasonable to expect forecasts to be prepared for large numbers of trip origins and destinations, the effort should be proportional to the potential contribution to demand of the different elements.

11.30 For example, if the station is not considered to be a major Attractor for trips, most of the effort of demand forecasting could be spent on forecasting the demand produced by the new station to what are considered to be the main 3 – 5 destinations. A high level estimate of the demand accounted for by other attractor

stations and those trips produced by other stations and attracted to the new station.

11.31 However, if the station is considered to be a Destination station, a more equal effort would be spent on forecasting a) demand produced by the new station to the main 3 – 5 attractor station and b) demand attracted to the new station from the main 5 – 10 producer stations. A high level estimate of the passenger demand accounted for by other flows could then be made.

Trip Rates

11.32 Whilst a trip rate approach was found to be the methodology used most often, there was considerable variation in the detail of how it was employed. For example different station catchments and explanatory variables were used. It was therefore not possible to compare and benchmark trip rates.

11.33 Independent analysis undertaken for this study showed that the impact on trips rates of including different explanatory variables was significant, and confirms the difficulty of benchmarking trip rates.

11.34 It is recommended that attempts should not be made to encourage uniformity in the application of the trip rate approach, since most stations will be unique and explanatory variables should be selected given an understanding of the local factors. However, it is critical that the documentation supporting the forecasts explains why (with reference to the specific new station) the explanatory variables were selected and the source of the parameters applied. The documentation should also make clear what factors the trip rate approach excludes and whether the forecasts have been adjusted to reflect these factors.

Application of Generic Forecasting Approach

11.35 Whilst the study reviewed the forecasts and forecasting methodologies for the majority of stations opened since privatisation, it was not able to identify whether the application of one forecasting methodology was able to produce accurate forecasts for a number of unique stations.

11.36 An exercise was therefore undertaken in which a single forecasting methodology was used to forecast demand for 7 stations, varying in geographic location and type of station. The methodology considered the socio-demographics of the station catchment area, the rail travel opportunities from other local stations, and the propensity to travel depending on proximity of home location to local station and provision of car parking. It was found that the approach could be used to provide reasonable (+/- 5% - 25%) forecasts of demand produced by the station. It would be possible to narrow this range and provide a means of verifying the forecasts through analysis of the NRTS, and it is recommended that such a study is commissioned, possibly starting with a scoping phase.

11.37 The generic model was not able (nor intended) to forecast demand where the station was predominantly an attractor of trips and therefore it is recommended that an additional means of forecasting demand from these types of station is investigated.

New Station Demand Forecasting Checklist

11.38 The extensive review of demand forecasts prepared for new stations highlighted the need for a guidance document to be made available to promoters to improve the quality of demand forecasts and to improve the consistency of presentation of this information in order to facilitate funding decisions.

11.39 A "New Stations Demand Forecasting Checklist" has been prepared as part of this study. The checklist outlines the types of issues which the promoter (and their consultants) would be expected to consider, including issues such as understanding the markets served by the station, accessibility of the station, presentation of the demand forecasts and identification and testing of risks to the forecasts.

11.40 It is recommended that this Checklist is included in the New Stations Guidance document which is being issued by DfT.

Primary Research

11.41 One of the main reasons for the lack of an industry recommended approach to demand forecasts for different types of station is the lack of primary research on passengers who use new stations, in particular their reasons for using the new station, their previous mode of travel (if they previously made the journey) and their home location. If more such information were available it would contribute to a better understanding of rail demand at new stations (including demand abstraction) and therefore improved forecasting of demand for new stations. This Study provides some guidance on the types of surveys that should be undertaken and the questions asked in these surveys.

11.42 It is therefore recommended that the DfT and TS encourage promoters to undertake surveys both before and after the station opens, and that the findings of these surveys should be disseminated to the wider industry audience.

APPENDIX

A

APPENDIX TITLE

Alloa

Aylesbury Vale Parkway

Brunstane (Edinburgh Crossrail)

Newcraighall (Edinburgh Crosrail)

Chandlers Ford

Chatelherault (Larkhall Line)

Larkhall (Larkhall Line)

Merryton (Larkhall Line)

Coleshill Parkway

Corby

Crosskeys (Ebbw Valley Line)

Ebbw Vale Parkway (Ebbw Valley Line)

Llanhilleth (Ebbw Valley Line)

Newbridge (Ebbw Valley Line)

Risca & Pontyminster (Ebbw Valley Line)

Rogerstone (Ebbw Valley Line)

Edinburgh Park

East Midlands Parkway

Glasshoughton

Imperial Wharf

Laurencekirk

Liverpool South Parkway

Mitcham Eastfields

Shepherds Bush

Vale of Glamorgan Line (Llantwit Major & Rhoose)

Warwick Parkway

ALLOA

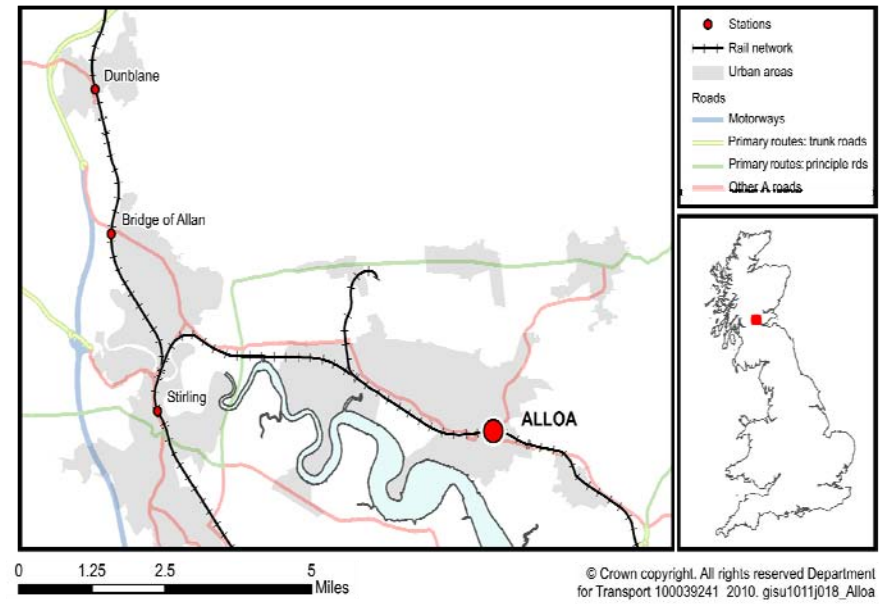
Opening Date **19th May 2008**

Description of Station:

Alloa station is on the newly re-opened line beteen Stirling and Kinkardine to relieve congestion on the Forth Bridge. Alloa is the only station on the route.

Prior to the opening of the station, Alloa (and Galashiels) were the two largest towns in Scotland without a passenger rail service)

Source: Wikipedia and The Scottish Govt website



Summary Information **Govt Office Region** Scotland **Station Facility Owner** Scotrail

Contact Information:

Other Contact Details (County Council or Promoter):

Station Categorisation
Other Residential
Park and Ride
Destination station: Work/Leisure
Part of a new line opening

Station Accessibility

Public Transport

The hub for the local (Clackmannanshire) bus network is in Alloa Town centre, adjacent to the location of the proposed Alloa railway station. At the time of Document (2) a new bus station and associated pedestrianisation and car parking was being constructed adjacent to the proposed station. This was thought to ensure bus and car passengers to change mode easily in Alloa. It was also envisaged that inter-modal ticketing scheme being developed by the Council would be complete by Spring 2000.

Car (incl Car Parking)

Demand forecasts (and other information) prepared by: MVA
Contact Details:

Demand forecast source documents:

1) Stirling Alloa Kincardine Railway: Review of Project Business Case, June 2005: Collated by tie. Within this document there is an MVA Information Note (dated 15th June 2005)

2) The Future of Rail Services for Clackmannanshire, June 1999: 1999 Assessment of the Type and Level of Services the Rail Network Should Provide - Submission to the Office of Rail Passenger Franchising by Clackmannanshire Council

3) Advice from Scott Prentice (SDG): previously seconded to Transport Scotland

4) Excel file from TS:"Dawn Maclin SAK costs franchise": 3 sheets related to Stirling-Alloa

Nominated Abstraction and Counterfactual Stations

Abstraction stations Stirling (though any change may be lost in "noise")
Counterfactual stations N/A

ALLOA : REVIEW OF DEMAND FORECASTS AND METHODOLOGY

Train Service

Planned

The service was assumed to be an extension of the Glasgow - Stirling service, running hourly. The journey time between Stirling and Alloa was assumed to be 10 minutes.

Actual

The service provided is an hourly service weekdays and weekends, with a journey time of 13 minutes. It is an extension of one of the Glasgow - Stirling services.

Document title, page number and table number of forecast demand:

Stirling Alloa Kincardine Railway: Review of Project Business Case, June 2005: Collated by tie within which there is an MVA Information Note (dated 15th June 2005)

Table 11.1 and the TEE Table provide the PV revenue

Method & assumptions used by SDG to convert demand forecast into same format (annual pax journeys) as LENNON station usage:

Subsequent to the calculation below, guidance from source 3) was that no forecasts of demand for Alloa station were originally prepared as part of the scheme to re-open the railway line to passenger services. The main drive for the project was to divert freight service off the Forth Bridge, to allow additional passenger services between Dundee and Fife to Edinburgh, It is therefore likely that the passenger revenue figure below is associated with this demand, NOT that from Alloa. It is understood that the decision to open a station at Alloa and operate passenger services to Stirling was in recompense to local Alloa residents for the additional freight services that would operate through the town.

Forecasts of Producer only or Producer AND Attractor Trips?

Further to the commentary above it is assumed that a high level view was taken of the likely trips both generated by Alloa and attracted to Alloa. Implicitly therefore both Producer and Attractor.

Observed demand shows that in 2008/9 24% of demand was accounted for by trips Attracted to Alloa

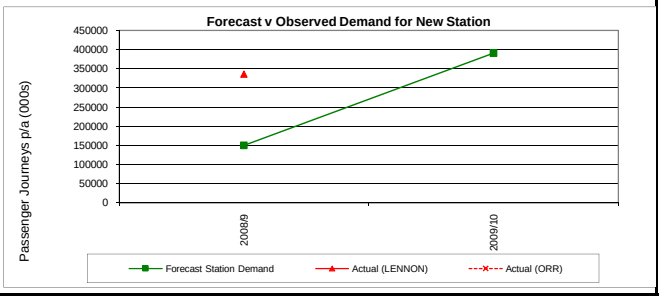
The only information on demand or revenue provided was that the PV (over 60 years) of passenger revenue is estimated to be £9.8m. SDG have undertaken a very approximate estimate of how this might translate into demand. Using standard discout rates of 3% and 3.5% and an opening year of 2007 and a base year of 2002 (as advised in the MVA report), we have assumed RPI+1% pa fares growth and 1.25% annual underl;yiong demand growth. This gives an annual revenue of £250,000 per annum, which is then uplifted to 2007 prices by 5 years of RPI

The annual revenue estimate was then converted into an estimated number of trips by assuming that 75% of journeys were to Stirling (6 miles) and the remaining 25% to Glasgow (36 miles), and a fare per mile of £0.17. This gives annual journeys to/from Alloa of 125,000

	2008/9	2009/10
Station Usage Data		
Forecast Station Demand	150000	390597
Actual (LENNON)	335687	
Actual (ORR)		

Comparison Commentary

The actual demand from Alloa is considerably higher than forecast. This is due to the very high levels of abstraction from bus. It is understood that most demand is to Stirling, with relatively little beyond (eg to Glasgow).



Modelling Technique Used

No information supplied in either document, other than that (in Doc 1) it was assumed that patronage for the new service would arise from relevant existing bus passengers transferring to rail and a proportion of existing car passengers, particularly those travelling between Alloa and Glasgow.

It is not clear how First Group (who operate the Scotrail franchise) arrived at their demand forecast for Alloa station.

Comments on appropriateness of modelling:

It is understood that Alloa station was a priced option in the franchise negotations for Scotrail. Because the pricing was unlikely to make or break the bid for the franchise there was no incentive for the bidders to prepare detailed demand forecasts.

Key Endogenous Modelling Assumptions (trip rates, elasticities etc, state source where provided)

No information supplied

Comments on appropriateness of modelling:

Abstraction Modelled? (state abstracted stations, assumptions and abstraction forecasts)
Abstraction defined as a) stations within "catchment" and b) stations affected by additional calling point

No information supplied

Comments on appropriateness of modelling:

SDG believe that there will be considerable abstraction from Stirling, meaning that abstraction modelling would have been essential.

Key Exogenous Modelling Assumptions (variables included, variable forecasts and elasticities)

No information provided

Comments on appropriateness of modelling:

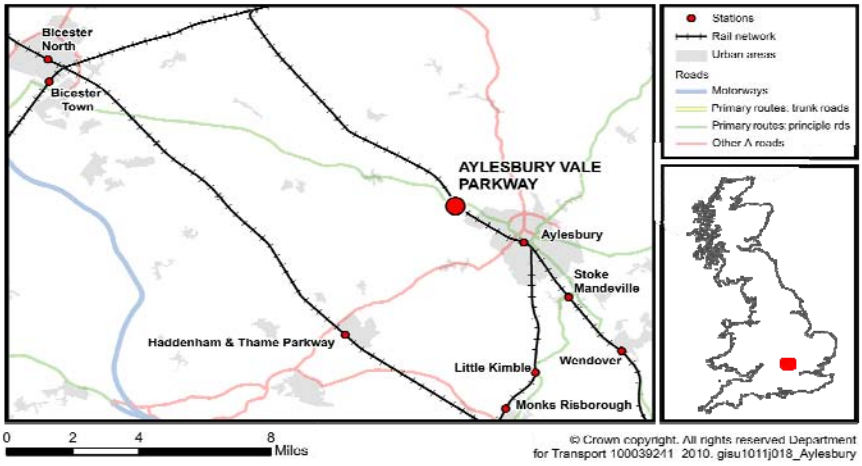
Demand Build-Up assumptions:	No information provided	Year 1	Year 2:	Year 3:	Year 4:

AYLESBURY VALE PARKWAY

Opening Date **14th December 2008**

Description of Station:
Aylesbury Vale Parkway is a station to the north of Aylesbury, adjacent to Berryfields and Weedon Hill Major Development Areas (MDA), projected to include a total of 3,850 houses and a 10 ha employment site. The station will have a dual role, both as a high quality sustainable transport choice for MDA residents and as a more accessible rail hub for residents of the Aylesbury Vale.

Source: Community Infrastructure Fund application



Summary Information **Govt Office Region** South East **Station Facility Owner** Chiltern Railways

Contact Information: Ian Walters, John Laing

Other Contact Details (County Council or Promoter): Chiltern Railways, Aylesbury Vale District Council (Martin Dalby), Buckinghamshire County

Station Categorisation Residential : London & South East
Park and Ride

Station Accessibility

Public Transport Bus services serving outlying villages serve AVP in the peaks

Car (incl Car Parking) Interface with both the park & ride capability and the adjacent A41 road, providing a multi-modal interchange for transport users. This appears to have opened at the same time as the station. Car parking is available for 500 (at least 100 of which is set aside for Park and Ride bus services to Aylesbury)

Demand forecasts (and other information) prepared by: Steer Davies Gleave
Contact Details: Steve Hunter

Demand forecast source documents: Community Infrastructure Fund application, Business Case report (CIF Bid Final 290705.pdf), July 2005 and Appendix E (Demand Forecasting Report_Final_Appendix E.doc)

Nominated Abstraction and Counterfactual Stations

Abstraction stations Aylesbury, Bicester
Counterfactual stations Stoke Mandeville, Wendover

AYLESBURY VALE PARKWAY : REVIEW OF DEMAND FORECASTS AND METHODOLOGY

Train Service

Planned Extension of Aylesbury services to London 2tph in the Peak, 1tph in the Off-Peak

Actual As planned, although need to check journey times

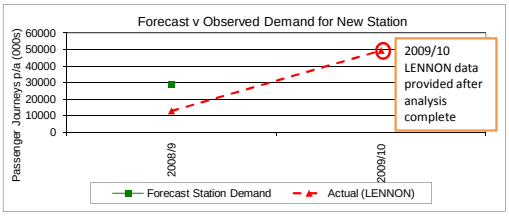
Document title, page number and table number of forecast demand:
CIF Fund application Business Case Report (CIF Bid Final 290705.pdf), page 32, Table 4.1 and 4.2

Method & assumptions used by SDG to convert demand forecast into same format (annual pax journeys) as LENNON station usage:
Forecasts only available from 2009/10 onwards. Forecast for 2009/10 is 95,000 journeys (16k generated, 24k abstracted from Aylesbury, 55k from MDA - of which 7k would have travelled from Aylesbury). Station opened 14 December 2008, giving 4 periods of 2008/09. As an indicator 4/13 of 95,000 is 29000.

Station Usage Data	**2008/9**	**2009/10**
Forecast Station Demand	29000	
Actual (LENNON)	13066	49444
Actual (ORR)		

Is it known that some demand is excluded from LENNON/ORR? (eg Travelcard) Yes, travelcard

Comparison Commentary
The full station infrastructure was not available until June 2009 and [need to check if the full service was running between these dates]. Anecdotally the shortfall could easily be explained by the lack of progress in the development of the Berryfields MDA



Modelling Technique Used
The development of a Parkway Access Model (PAM), which compares levels of accessibility to rail services with and without the new station. It estimates the extent of transfer of existing rail business to the new station and the amount of new business generated by the access improvements

Comments on appropriateness of modelling:
Sensible interpretation of PDFH guidance on trip rate and parkway access models

Key Endogenous Modelling Assumptions (trip rates, elasticities etc, state source where provided)
PAM model uses elasticity of -0.9 to generalised time improvement to individual hexs based on survey data.
Trip rates derived locally based on Census data in MDA area and Aylesbury, increase from 3-6 without AVP to 11-18 with. Plus inbound approximation of 10% and estimate of employment impact. Subsequent adjustment to trip rates to reflect 'market price' of housing, which would result in a higher proportion of London-bound commuters than from existing market. More than doubles the MDA element of the forecast, adding 50% to the original forecasts

Comments on appropriateness of modelling:

PAM model appears thorough. Trip rate derivation also thorough, although very sensitive to subsequent adjustment to propensity of MDA population to commute to London by rail.

Abstraction Modelled? (state abstracted stations, assumptions and abstraction forecasts)
Abstraction defined as a) stations within "catchment" and b) stations affected by additional calling point

Abstraction has been explicitly modelled. Stations other than Aylesbury have been explicitly considered using a catchment style analysis and assumed to be zero. Aylesbury demand has been explicitly modelled using the PAM. Given there are no through services, no demand is lost through services being slowed

Comments on appropriateness of modelling:
Again appears thorough, although would have appreciated some sensitivity tests to test the assumption about other stations

Key Exogenous Modelling Assumptions (variables included, variable forecasts and elasticities)
Taken from franchise bid models predicting a baseline of growth based on forecasts of population change (from TEMPRO) and changes in GDP and London Employment. Demand from the Berryfields MDA is assumed to build up proportionately to the build rate for the development

Comments on appropriateness of modelling:
Appropriate, assuming underlying growth from bid model excludes some of the more optimistic demand drivers that can be included

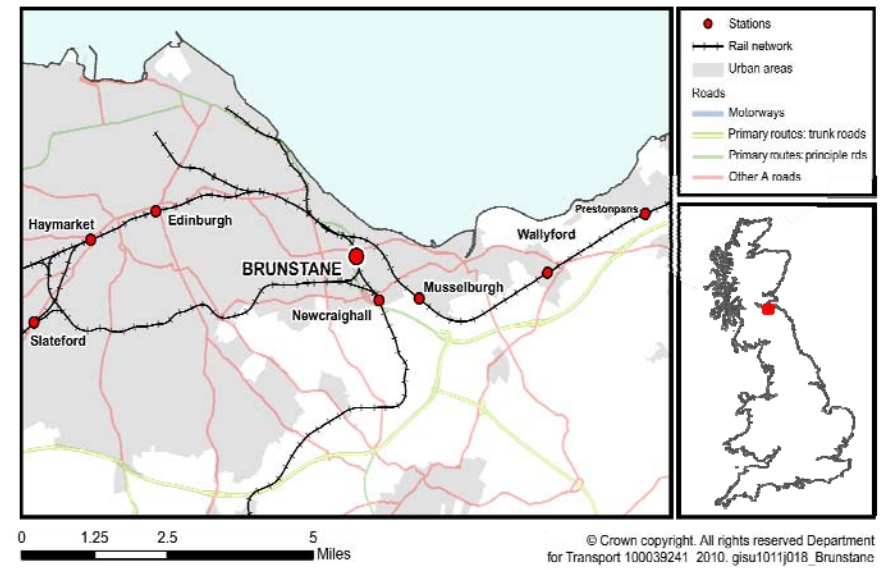
Demand Build-Up assumptions: For the demand abstracted from Aylesbury it has been assumed that there will be 60% of the full impact in the first year, 85% in the second with the full impact in the third year. For the generated demand 60% has been assumed for year 1, 75% for year 2, 90% for year 3 and the full impact in year 4

BRUNSTANE (EDINBURGH CROSSRAIL)

Opening Date **2nd June 2002**

Description of Station:
Brunstane train station is a station on the Edinburgh Crossrail service. It is an unstaffed halt, with ramp down to single platform.

Source: ScotRail



Summary Information **Govt Office Region** Scotland **Station Facility Owner** First ScotRail

Contact Information:

Other Contact Details (County Council or Promoter): City of Edinburgh Council / Strategic Rail Authority

Station Categorisation Other Residential
Part of a new line opening

Station Accessibility

Public Transport No information available

Car (incl Car Parking) No information available

Demand forecasts (and other information) prepared by: Halcrow Group Limited
Contact Details: 0207 602 7282

Demand forecast source documents:
1) RPP Case study-Edinburgh Crossrail
2) Policy Evaluation-RPP&RPF Final Report Volume 1 (January 2004)
3) The Future of Rail Services for Clackmannanshire, June 1999: 1999 Assessment of the Type and Level of Services the Rail Network Should Provide - Submission to the Office of Rail Passenger Franchising by Clackmannanshire Council

Nominated Abstraction and Counterfactual Stations

Abstraction stations Musselburgh
Counterfactual stations

BRUNSTANE (EDINBURGH CROSSRAIL) : REVIEW OF DEMAND FORECASTS AND METHODOLOGY

Train Service

Planned No information supplied, however it is understood that the service was planned to call at Edinburgh Park station, serving the Edinburgh Park business park and the Hermiston Gait shopping centre

Actual A half-hourly service runs inbound to Edinburgh Waverley station from Newcraighall station via Brunstane between 06.49 and 20.19, followed by an hourly service from 21.04 until the final returning train at 23.49. Outbound from Edinburgh Waverley station, a half-hourly service is operated between 06.25 and 19.57 followed by an hourly service between 20.32 and 23.32. There is no Sunday service.

The service does not currently call at Edinburgh Park station and over the 5 years of operation the calling points (in Edinburgh and to the west) have varied.

Document title, page number and table number of forecast demand:

1) RPP Case study-Edinburgh Crossrail (Page 14/15, Table C.5)
2) Policy Evaluation-RPP&RPF Final Report Volume 1 - January 2004 (Page 22)

Forecasts of Producer only or Producer AND Attractor Trips?

Document 1) states that one of the benefits of the scheme would be to "Improve public transport to significant recent and projected developments including retail and commercial developments at Newcraighall and Edinburgh Park". This implies that the forecasts should have projected Attractor trips. Document 2) simply says "ridership (2-way) of around 600,000 p.a". There is no information on the forecasting methodology used. We have therefore assumed that both Producer and attractor trips were included in the forecasts (and therefore compared the forecast demand with the sum of observed PA journeys).

Observed demand shows that in 2008/9 31% of demand was accounted for by trips Attracted to Brunstane (this is higher than those to Newcraighall which had been assumed to be more of an "Attractor" station

Method & assumptions used by SDG to convert demand forecast into same format (annual pax journeys) as LENNON station usage:

Document 1) gives the forecast demand at each station in Years 1 - 5. These are presented in terms of 1-way boarders.
The report states that the 2-way ridership of on Crossrail 600,000 is expected after build-up. Reviewing the daily demand in each of the first 5 years and the implied growth rates - it appears that build-up is expected to be complete after 5 years of service. If an annualisation factor of 280 is applied to the Year 2 1-way daily figues then a forecast of 600,000 journeys is obtained.

This annualisation factor is then aplied to the forecast 1-way daily boarders at Brunstane, and then doubled to get the annual 2-way journeys

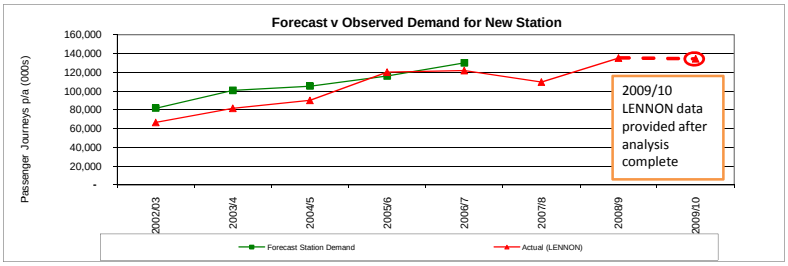
In 3) there is a document which describes forecasting Crossrail demand using MVA/CEC's JIF strategic multi-modal model and the VIPS PT model of the Edinburgh/Lothian area. This forecast 121503 boarders per annum (in 2010) at Brunstane. This forecast is almost double those forecasts in the other documents.

The demand indicates trips produced at the station. No information about attacted demand.

Station Usage Data	**2002/03**	**2003/4**	**2004/5**	**2005/6**	**2006/7**	**2007/8**	**2008/9**	**2009/10**
Forecast Station Demand	81,760	100,800	105,280	115,920	129,920			
Actual (LENNON)	66,580	81,672	89,953	120,038	121,758	109,536	135,144	134,291
Actual (ORR)								

Comparison Commentary

Based on the conversion of forecast data into a format consistent with MOIRA, forecasts for Brunstane perform well compared to observed demand



Modelling Technique Used

No information provided in the available documentation

Comments on appropriateness of modelling:

Key Endogenous Modelling Assumptions (trip rates, elasticities etc, state source where provided)

The only modelling information mentionned in the documentation states that: In respect of revenue projections, the greatest area of concern is the robustness of P&R estimates. The bid is heavily dependent upon P&R revenue, which represents around 50% of total revenue. CEC/MVA's model points to a shift of 6.3% in total trips transferring to P&R over the 12 hour day (16% for AM peak transfers)

Comments on appropriateness of modelling:

Abstraction Modelled? (state abstracted stations, assumptions and abstraction forecasts)
Abstraction defined as a) stations within "catchment" and b) stations affected by additional calling point

No information provided in the available documentation

Comments on appropriateness of modelling:

Key Exogenous Modelling Assumptions (variables included, variable forecasts and elasticities)

The documentation states that exogenous growth of 2% pa was implied (in the original RPP bid)

Comments on appropriateness of modelling:

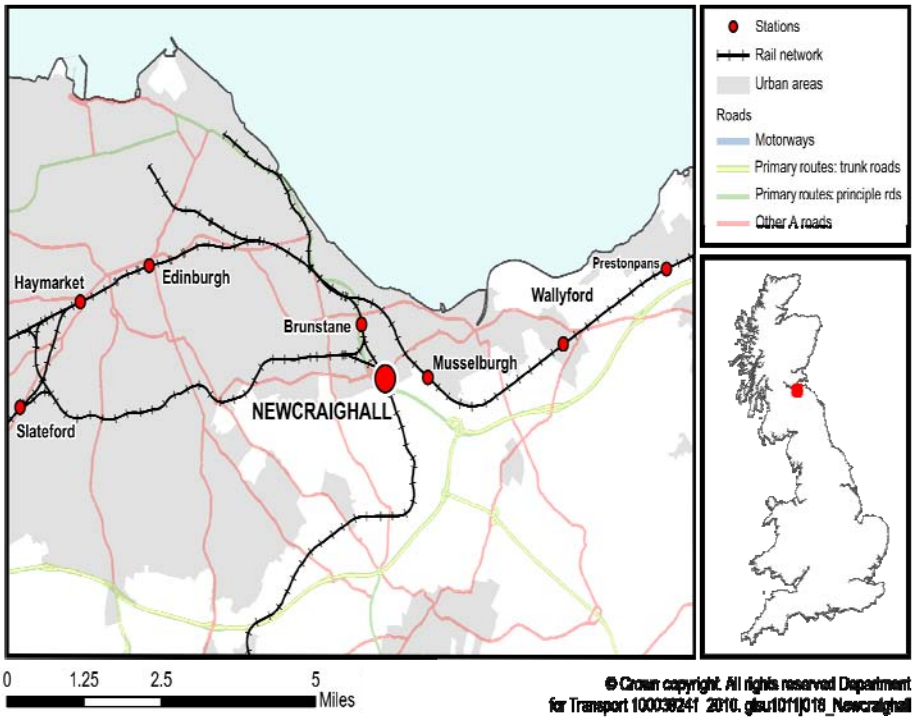
Demand Build-Up assumptions: No information available Year 1 Year 2: Year 3: Year 4:

NEWCRAIGHALL (EDINBURGH CROSSRAIL)

Opening Date **2nd June 2002**

Description of Station:
Newcraighall train station is a station on the Edinburgh Crossrail service. It is an unstaffed halt, with ramp up to a single platform. It was planned that Newcraighall would be a park and ride station and over 500 parking spaces were provided.

Source: ScotRail



Summary Information **Govt Office Region** Scotland **Station Facility Owner** First ScotRail

Contact Information:

Other Contact Details (County Council or Promoter): City of Edinburgh Council / Strategic Rail Authority

Station Categorisation Park and Ride
Part of a new line opening

Station Accessibility

Public Transport

Car (incl Car Parking) There is a large car park with 560 spaces, incl. 30 for Blue Badge holders. There are 20 cycle racks & 10 cycle lockers. The park and ride facility has capacity for 500 vehicles and is expandable to 1000 vehicles. The car park has parking ticket machines. Parking costs are 50p per day

Demand forecasts (and other information) prepared by: Halcrow Group Limited
Contact Details: 0207 602 7282

Demand forecast source documents:
1) RPP Case study-Edinburgh Crossrail
2) Policy Evaluation-RPP&RPF Final Report Volume 1 (January 2004)
3) The Future of Rail Services for Clackmannanshire, June 1999: 1999 Assessment of the Type and Level of Services the Rail Network Should Provide - Submission to the Office of Rail Passenger Franchising by Clackmannanshire Council

Nominated Abstraction and Counterfactual Stations

Abstraction stations Musselburgh
Counterfactual stations

NEWCRAIGHALL (EDINBURGH CROSSRAIL) : REVIEW OF DEMAND FORECASTS AND METHODOLOGY

Train Service

Planned

No information supplied, however it is understood that the service was planned to call at Edinburgh Park station, serving the Edinburgh Park business park and the Hermiston Gait shopping centre

Actual

A half-hourly service runs inbound to Edinburgh Waverley station (and thence to from Newcraighall station via Brunstane between 06.49 and 20.19, followed by an hourly service from 21.04 until the final returning train at 23.49. Outbound from Edinburgh Waverley station, a half-hourly service is operated between 06.25 and 19.57 followed by an hourly service between 20.32 and 23.32. There is no Sunday service.

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Document 1) states that one of the benefits of the scheme would be to "Improve public transport to significant recent and projected developments including retail and commercial developments at Newcraighall and Edinburgh Park". This implies that the forecasts should have projected Attractor trips. Document 2) simply says "ridership (2-way) of around 600,000 p.a". There is no information on the forecasting methodology used. We have therefore assumed that both Producer and attractor trips were included in the forecasts (and therefore compared the forecast demand with the sum of observed PA journeys).

Observed demand shows that in 2008/9 only 23% of demand was accounted for by trips Attracted to Newcraighall

Method & assumptions used by SDG to convert demand forecast into same format (annual pax journeys) as LENNON station usage:

Document 1) gives the forecast demand at each station in Years 1 - 5. These are presented in terms of 1-way boarders.

The report states that the 2-way ridership of on Crossrail 600,000 is expected after build-up. Reviewing the daily demand in each of the first 5 years and the implied growth rates - it appears that build-up is expected to be complete after 5 years of service. If an annualisation factor of 280 is applied to the Year 2 1-way daily figues then a forecast of 600,000 journeys is obtained.

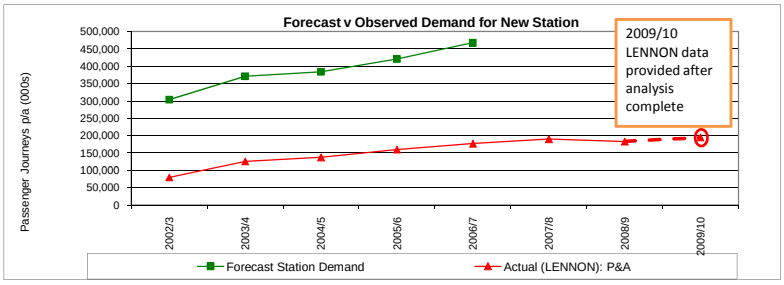
This annualisation factor is then aplied to the forecast 1-way daily boarders at Newcraighall , and then doubled to get the annual 2-way journeys

In 3) there is a document which describes forecasting Crossrail demand using MVA/CEC's JIF strategic multi-modal model and the VIPS PT model of the Edinburgh/Lothian area. This forecast 270540 boarders per annum (in 2010) at Kinnaird Park (which later was renamed Newcraighall). This forecast is of the same order of magnitude as forecasts in the other documents.

Station Usage Data	**1999/00**	**2000/01**	**2001/02**	Year 1 **2002/3**	Year 2 **2003/4**	Year 3 **2004/5**	Year 4 **2005/6**	Year 5 **2006/7**	Year 6 **2007/8**	**2008/9**	**2009/10**
Forecast Station Demand				304,080	371,280	384,160	421,120	467,600			
Actual (LENNON): P&A				79,566	125,738	137,263	159,692	176,975	190,064	182,902	194,192
Actual (ORR)											

Comparison Commentary

Actual demand is considerably lower than forecast, for a number of likely reasons. The train frequency is 2tph which is insufficient for a PnR station, and the trains are not clock-face, such that at some times of day there is a 45 minute service interval. Furthermore, there is a charge for car parking at the station, and the incentive for PnR is limited as there is little road congestion on this side of Edinburgh.



Modelling Technique Used

No information provided in the available documentation.

Comments on appropriateness of modelling:

The RPP review documentation states that in the RPP bid it was assumed that 50% of Newcraighall passengers would be park and ride passengers. The RPP review stated that the emerging figure was only one third of passengers.

Key Endogenous Modelling Assumptions (trip rates, elasticities etc, state source where provided)

The only modelling information mentionned in the documentation states that: "In respect of revenue projections, the greatest area of concern is the robustness of P&R estimates. The bid is heavily dependent upon P&R revenue, which represents around 50% of total revenue. CEC/MVA's model points to a shift of 6.3% in total trips transferring to P&R over the 12 hour day (16% for AM peak transfers)".

Comments on appropriateness of modelling:

Abstraction Modelled? (state abstracted stations, assumptions and abstraction forecasts)
Abstraction defined as a) stations within "catchment" and b) stations affected by additional calling point

No information supplied

Comments on appropriateness of modelling:

Key Exogenous Modelling Assumptions (variables included, variable forecasts and elasticities)

The documentation states that exogenous growth of 2% pa was implied (in the original RPP bid)

Comments on appropriateness of modelling:

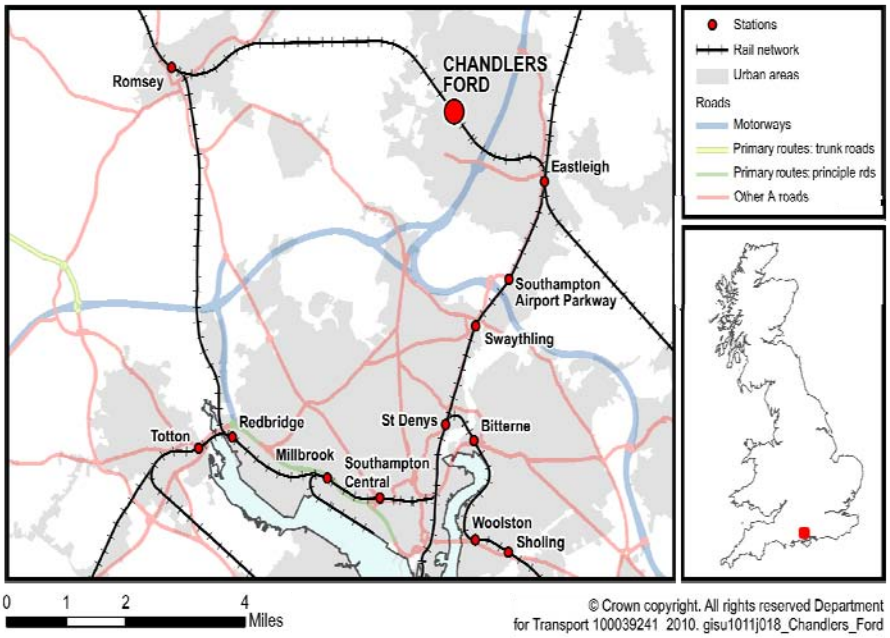
Demand Build-Up assumptions:	Year 1	Year 2:	Year 3:	Year 4:

CHANDLERS FORD

Opening Date **12th December 2004**

Description of Station:
The proposed scheme would extend the current Southampton-Eastleigh local service to provide an all-stations, Totton-Southampton-Eastleigh-Chandler's Ford-Romsey service, using diesel rolling stock to replace electric units currently used. A new station would be provided at Chandlers Ford, on the site of one closed in 1969 and would serve the housing development in the area (over 22,000 living within 2.5km of the station).

Source: Wikipedia



Summary Information	**Govt Office Region**	South East	**Station Facility Owner**	South West Trains

Contact Information:

Other Contact Details (County Council or Promoter): Hampshire County Council and SWT

Station Categorisation Residential : London & South East

Station Accessibility

Public Transport The new station would have secure cycle storage and be at the centre of a new cycle route network and near bus stops, with potential for some buses serving the station forecourt.

Car (incl Car Parking) There is a 47 space car park at the station

Demand forecasts (and other information) prepared by: Mott MacDonald (based on logit model by SDG)

Contact Details: Tessa Wordsworth/Dick Dapre at SDG

Demand forecast source documents:

1) South Hampshire Crossrail: Formal Bid for RPP Funding (August 2002): Hampshire CC and SWT and other word and excel documents provided by Mott MacDonald

2) RPP Case Study - South Hants Crossrail: Halcrow (Alan Peakall)

3) Policy Evaluation: - RPP & RPF: Final Report – Volume 1, Main Report, January 2004 for SRA (Assignment Number 2003/00097) by Halcrow (Alan Peakall)

Nominated Abstraction and Counterfactual Stations

Abstraction stations	Eastleigh and Romsey
Counterfactual stations	Shawford, Dunbridge

CHANDLERS FORD : REVIEW OF DEMAND FORECASTS AND METHODOLOGY

Train Service

Planned

Services would run hourly from approximately 0600 to 2330 on Mondays to Saturdays, and 0900 to 2200 on Sundays, timings influenced by the Passenger Service Requirement to connect with London trains between Eastleigh and Southampton. Sunday services would allow the Bournemouth-Waterloo service to reduce its journey times by omitting suburban stations at Redbridge, Swaythling and St Denys, and would double the frequency of Southampton-Eastleigh Trains. Journey time from Chandlers Ford - Soton Central assumed to be 21 minutes.

Actual

Hourly frequency throughout the week (as per planned services), with a journey time from Chandlers Ford - Soton Central of 22 minutes

Document title, page number and table number of forecast demand:

RPP Case Study - South Hants Crossrail: Halcrow (Alan Peakall) Table L.2

Forecasts of Producer only or Producer AND Attractor Trips?

The demand forecasting model shows that a full matrix of existing car and bus trips were considered for transfer to rail. As trips from one zone "A" to another "Zone B" are not the same we have assumed that this represents both Producer and Attractor trips.

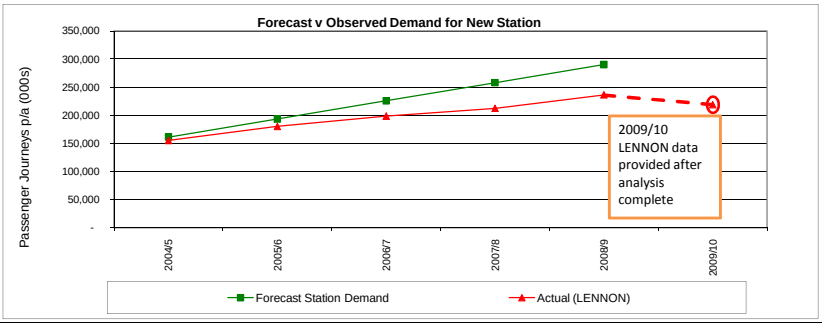
Observed demand shows that in 2008/9 31% of demand was accounted for by trips Attracted to Chandlers Ford

Method & assumptions used by SDG to convert demand forecast into same format (annual pax journeys) as LENNON station usage:

	2004/5	2005/6	2006/7	2007/8	2008/9	2009/10
Station Usage Data						
Forecast Station Demand	161,243	193,491	225,740	257,988	290,237	
Actual (LENNON)	155,381	180,205	198,596	212,517	236,145	218,748
Actual (ORR)						

Comparison Commentary

Whilst actual demand for the first year was within 5% of forecast, since then the growth in demand has been slower than forecast. Such that actual demand is now 23% lower than forecast. It appears that the core forecast of demand was over-estimated, as the early years demand was calculated by applying a build-up factor to the core forecast.



Modelling Technique Used

The main source of demand for the South Hampshire Crossrail service was expected to be people travelling between Chandlers Ford and Southampton. Two alternative approaches were used to forecasts this demand, a logit model which forecasts the transfer from car and bus to rail, and also generated trips (assuming 15% of off-peak demand was generated), and a trip rate model, which forecasts demand based on the trip rates from Eastleigh to Southampton. The report advised that the two models provide very similar forecasts [the trip rate approach forecast a level of revenue 2% higher than the logit model]. The source of the "base year" volumes of existig car and bus trips is unclear: they are presented on a zone to zone basis. Demand in the logit model was forecast for the am peak, off-peak and pm peak.

For demand from Romsey to Chandlers Ford, two alternative models were also developed: a trip rate model, and a gravity model. The trip rate model forecast demand based on the existing demand from Romsey to Eastleigh, and adjusted this according to the difference in trip rate expected from Chandlers Ford and Eastleigh. A simple gravity model, based on the populations of Romsey, Eastleigh, Chandlers Ford and Southampton, and the distances between these locations was also used to forecast demand. Both models indicated demand of a similar order of magnitude.

The MOIRA model was considered an appropriate tool to forecast the impact on rail revenue between stations which were previously served by rail.

Comments on appropriateness of modelling:

Modelling approach appears sensible.

Key Endogenous Modelling Assumptions (trip rates, elasticities etc, state source where provided)

Proportion transferring from car to rail = 1/(1+exp(0+0.4x(rail gen cost - car gen cost + mode penalty wrt car/100) where the mode penalty is 76.22

Proportion transferring from bus to rail = 1/(1+exp(0+0.7x(rail gen cost - bus gen cost + mode penalty wrt bus/100) where the mode penalty is -65.33

Comments on appropriateness of modelling:

Abstraction Modelled? (state abstracted stations, assumptions and abstraction forecasts)
Abstraction defined as a) stations within "catchment" and b) stations affected by additional calling point

Demand forecasts are based upon transfer from car and bus, together with an assumption for new (generated) trips. There was therefore no need to forecast abstraction from other stations.

Comments on appropriateness of modelling:

Key Exogenous Modelling Assumptions (variables included, variable forecasts and elasticities)

Exogenous growth 2002/3 to 2008 was incorporated within the build-up factors.
2008 - 2010: Peak exogenous growth 3% pa, off-peak 4%.
2010 onwards peak 2% pa, off-peak 3% pa

Comments on appropriateness of modelling:

Exogenous demand appears cautious (with hindsight)

Demand Build-Up assumptions:

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Chandlers Ford trips	50%	60%	70%	80%	90%	100%
Other trips	70%	80%	85%	90%	95%	100%

CHATELHERAULT (LARKHALL LINE)

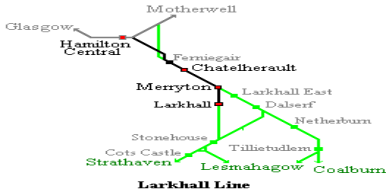
Opening Date **12th December 2005**

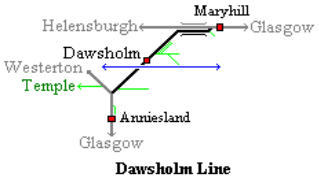
Description of Station:

Chatelherault railway station in the village of Ferniegair (outskirts of Hamilton, South Lanarkshire) is on the Argyle Line. The station was officially opened in December 2005, as part of the Larkhall branch which was re-opened at the same time. The station is located alongside the M74 and can be reached in approximately 5 minutes by car thus making it a convenient option for Park and Ride.

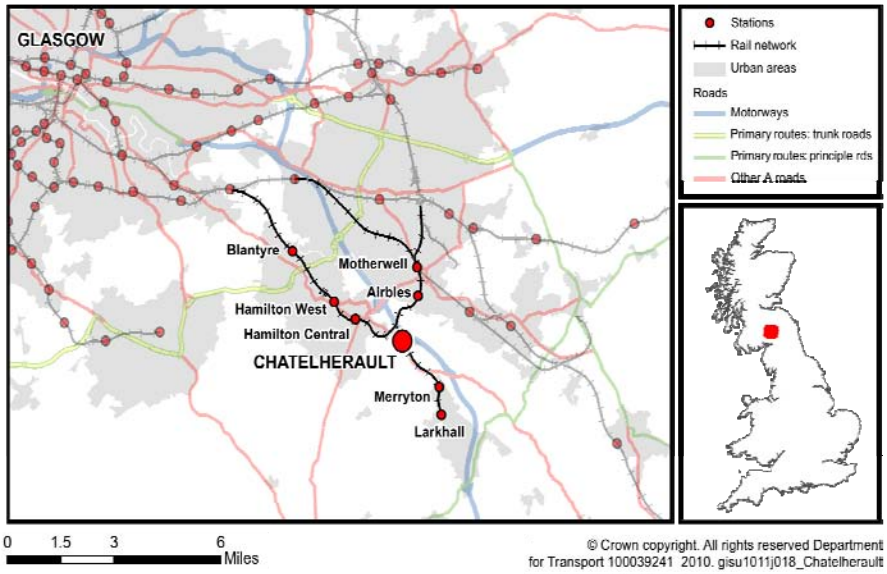
It is an unstaffed halt with ramp to single platform. The station has customer information monitors, a customer help point fitted with induction loop on the platform and CCTV in operation.

The main elements of the Larkhall/Milngavie project was the opening of the Larkhall line between Haughhead Junction (Hamilton) and the former Larkhall central station (current Larkhall station) and the extension of the Northern suburban line from Maryhill station to Anniesland. The line project was expected to assist in land use development and regeneration in the vicinity of the route corridor.





Source: Wikipedia / First ScotRail



Summary Information	**Govt Office Region**	Scotland	**Station Facility Owner**	First ScotRail

Contact Information:

Other Contact Details (County Council or Promoter):

Iain Wylie, Strathclyde Passenger Transport
Consort House, 12 West George Street, Glasgow G2 1HN
0141 333 3179

Station Categorisation

Other Residential
Park and Ride
Part of a new line opening

Station Accessibility

Public Transport The closest bus stops to Chatelherault rail station is Chatelherault country park located at Carlisle road. The bus stops within a couple of minutes walk of the station and serve Birkenshaw and East Kilbride (2 bph) and Allanton and Bellshill (3 bph).

Car (incl Car Parking) There is a car park with 100 spaces including 6 for blue badge holders. There are 4 cycle lockers.

Demand forecasts (and other information) prepared by: Paul Visser / Colin Morrison (Strathclyde Passenger Transport)
Contact Details: 0141 333 3284

Demand forecast source documents:

1) Modelling Report - Larkhall/Milngavie Rail Project (November 2000/February 2000)
Prepared by : Paul Visser / Colin Morrison
2) Larkhall to Milngavie PPP Project - Reappraisal of Investment Case 1999/00

Nominated Abstraction and Counterfactual Stations

Abstraction stations	Hamilton Central, Shieldmuir
Counterfactual stations	Hamilton West

CHATELHERAULT: REVIEW OF DEMAND FORECASTS AND METHODOLOGY

Train Service

Planned Half hourly service over the route between Chatelherault and Partick and a quarter hourly day time frequency over the route between Milngavie and Patrick.

Actual 2 tph between Chatelherault and Partick leaving at 12 and 42 past the hour with an average journey time of 32 minutes.
4 tph between Partick and Milngavie leaving at 05,20,35 and 50 past the hour with an average journey time of 17 minutes.

Document title, page number and table number of forecast demand:
1) Modelling Report - Larkhall/Milngavie Rail Project (November 2000)

Forecasts of Producer only or Producer AND Attractor Trips?
SITM 3 Model forecasts demand. This sub model effectively converts population and social and economic developments, such as manufactoring and retail centres, into demand for travel to and from each zone. See Modelling Report Page17. It is therefore assumed that the forecasts are for Generated AND Attracted demand.

Observed demand shows that in 2008/9 31% of demand was accounted for by trips Attracted to Chatelherault.

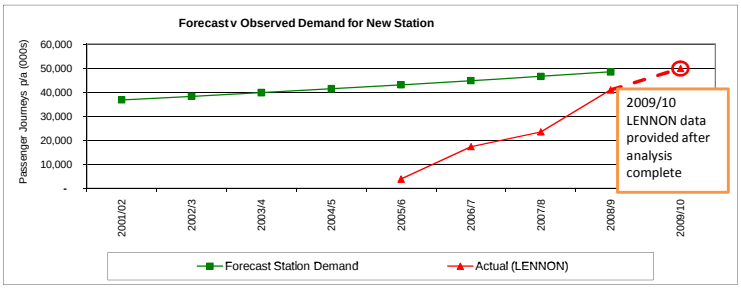
Method & assumptions used by SDG to convert demand forecast into same format (annual pax journeys) as LENNON station usage:
The total forecast rail demand with the Larkhall/Milngavie rail project is found in page 43 (Figure 3). This is a total of 57,064,229 boardings for 2001. The daily rail demand for the base case,'do minimum' is 196,903 (Page 23, Table 7.2.5). The increase in rail boardings after the project is 4,795 for 2001. Therefore the total daily boardings after the Larkhall/Milngavie rail project is 201,698 (196,903+4,795). With this information it is possible to find the annualisation factor which is 283 (57,064,229/196,903).

The information above allows us to calculate the annual demand for each station. The daily demand for new stations in 2001 is available in page 30 (Table 7.3.17). Total daily boarders and alighters for Chatelherault in 2001 was 130. Upon applying the annualisation factor, total forecast demand for 2001 at Chatelherault is 36,779.

The forecast demand available is for 2001. However, the actual project start date was December 2005. As the exogenous growth is not available in the documents provided, SDG assumes a 4% per annum growth rate for demand.

Station Usage Data	**2001/02**	**2002/3**	**2003/4**	**2004/5**	**2005/6**	**2006/7**	**2007/8**	**2008/9**	**2009/10**
Forecast Station Demand	36,779	38,251	39,781	41,372	43,027	44,748	46,538	48,399	
Actual (LENNON)					3,763	17,331	23,472	40,922	49,854
Actual (ORR)									

Comparison Commentary
The LENNON figure for 2005/6 represents 3 months of service operation and the following year probably reflects a build-up effect (with actual demand being half that forecast). By the end of the 3rd year of operation (when one would people to have shifted mode and some to have relocated home to a location served by the new line) the actual demand is within 20% of forecast. It will be interesting to see what the comparison is in 2009/10 as one would expect the effect to be purely exogenous growth.



Modelling Technique Used
The model used is the Strathclyde Integrated Transport Model (SITM), a 4 stage transport model used for transport planning in conjunction with varying land use or roads and passenger transport network development scenarios. The core internal area covers the whole of the Clydeside conurbation and the external area covers the rest of UK.

The SITM consists a number of sub models; Car availability model, Trip end model, Trip distribution model, Model split model, Parking model, Highway assignment model, Public transport assignment model and an Economics model.

The trip distribution model produced matrices of person trips at the 24 hour level, split by car available and non car available.

The modal split model compared the costs of a journey by each mode, taking into account in vehicle time, walk time, wait time, and direct costs. A logit function was applied taking the utility values for each mode to give the proportions of trips made by each mode.

The public transport assignment model was used to determine by which alternative sub modes the public transport trips were made.

The modal split procedure was also run in the parking, highway assignment and public transport models.

The modal split pocedure was the primary linkage between the highway and public transport sides of the SITM. It took the 24 hour matrices of CA trips output from the distribution model and divided them into private and public transport users. The whole procedure involved iterative use of the modal split model, the city centre parking model, the highway assignment model and the public transport assignment model.

The modelling package was run for the 'base' case simulating the current 'do minimum' scenario. This includes the current base highway and public transport networks with only the committed schemes for future years coded. Afterwards, 'test' scenarios were run to simulate the network conditions.

Comments on appropriateness of modelling:

Key Endogenous Modelling Assumptions (trip rates, elasticities etc, state source where provided)
The planning data was supplied by all the local authorities within the SITM modelled area.
No information provided in the available documents

Comments on appropriateness of modelling:

Abstraction Modelled? (state abstracted stations, assumptions and abstraction forecasts)
Abstraction defined as a) stations within "catchment" and b) stations affected by additional calling point
No additional information provided in the available documents. However, it is expected that the SITM model does model abstraction since it is a network model

Comments on appropriateness of modelling:

Key Exogenous Modelling Assumptions (variables included, variable forecasts and elasticities)
The economic growth rate selected for the study was the mid point of the governments low and high forecasts for economic growth.

Comments on appropriateness of modelling:

Demand Build-Up assumptions: Year 1 Year 2: Year 3: Year 4:
No information provided in the available documents

LARKHALL (LARKHALL LINE)

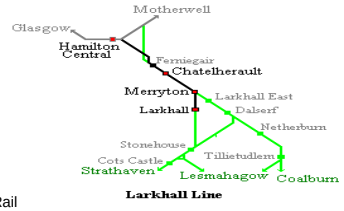
Opening Date **12th December 2005**

Description of Station:

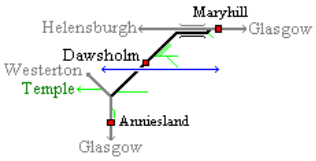
Larkhall railway station serves the town of Larkhall, South Lanarkshire. The station is the south-eastern terminus of the Argyle Line, 26 km (16¼ miles) south east of Glasgow Central railway station and is accessible in 5 minutes by car from the M74.

It is an unstaffed halt with ramp down to platform 2 or level from car park. The station has customer information monitors, CCTV and ticket vending machines. There are 2 customer help points fitted with induction loops on the platforms.

The main elements of the project was the opening of the Larkhall line between Haughhead Junction (Hamilton) and the former Larkhall central station (current Larkhall) and the extension of the Northern suburban line from Maryhill station to Anniesland. The project was expected to meet all objectives set out by Strathclyde Passenger Transport (SPT) and would assist in land use development and regeneration in the vicinity of the route corridor.

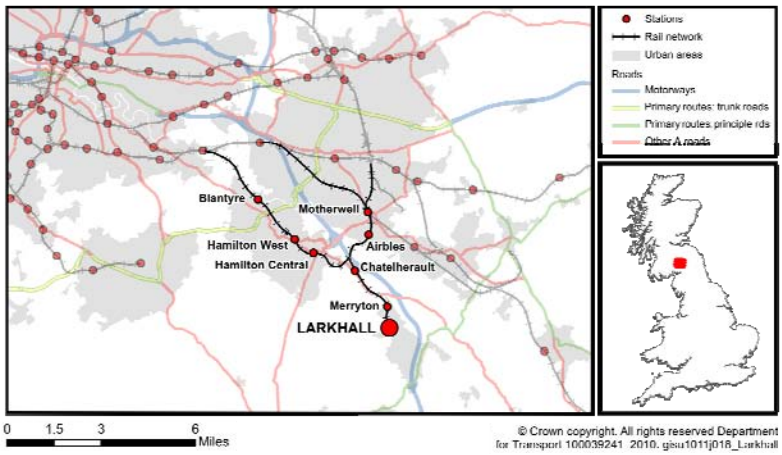


Larkhall Line



Dawsholm Line

Source: Wikipedia / First ScotRail



Summary Information **Govt Office Region** Scotland **Station Facility Owner** First ScotRail

Contact Information:

Other Contact Details (County Council or Promoter):

Iain Wylie, Strathclyde Passenger Transport
Consort House, 12 West George Street, Glasgow G2 1HN
0141 333 3179

Station Categorisation

Other Residential
Park and Ride
Part of a new line opening

Station Accessibility

Public Transport

The closest bus stops to Larkhall rail station is located at Union street and Montgomery street. The bus stops within a couple of minutes walk of the station and serve Merryton street and Millburn place (2 bph), Union street and Hamilton bus station (1 bph) and Hamilton bus station and Lanark bus station (1 bph).

Car (incl Car Parking)

There is a local authority car park and ride facility with 214 spaces including 13 for blue badge holders and 4 cycle lockers

Demand forecasts (and other information) prepared by: Paul Visser / Colin Morrison (Strathclyde Passenger Transport)
Contact Details: 0141 333 3284

Demand forecast source documents:

1) Modelling Report - Larkhall/Milngavie Rail Project (November 2000/February 2000)
Prepared by : Paul Visser / Colin Morrison
2) Larkhall to Milngavie PPP Project - Reappraisal of Investment Case 1999/00

Nominated Abstraction and Counterfactual Stations

Abstraction stations Hamilton Central, Shieldmuir
Counterfactual stations Hamilton West

LARKHALL : REVIEW OF DEMAND FORECASTS AND METHODOLOGY

Train Service

Planned Half hourly service over the route between Larkhall and Partick and a quarter hourly day time frequency over the route between Milngavie and Patrick.

Actual 2 tph between Larkhall and Partick leaving at 07 and 37 past the hour with an average journey time of 37 minutes.

4 tph between Partick and Milngavie leaving at 05,20,35 and 50 past the hour with an average journey time of 17 minutes.

Document title, page number and table number of forecast demand:

1) Modelling Report - Larkhall/Milngavie Rail Project (November 2000)

Forecasts of Producer only or Producer AND Attractor Trips?

SITM 3 Model forecasts demand. This sub model effectively converts population and social and economic developments, such as manufactoring and retail centres, into demand for travel to and from each zone. See Modelling Report Page17. It is therefore assumed that the forecasts are for Generated AND Attracted demand.

Observed demand shows that in 2008/9 22% of demand was accounted for by trips Attracted to Larkhall.

Method & assumptions used by SDG to convert demand forecast into same format (annual pax journeys) as LENNON station usage:

The total forecast rail demand with the Larkhall/Milngavie rail project is found in page 43 (Figure 3). This is a total of 57,064,229 boardings for 2001. The daily rail demand for the base case,'do minimum' is 196,903 (Page 23, Table 7.2.5). The increase in rail boardings after the project is 4,795 for 2001. Therefore the total daily boardings after the Larkhall/Milngavie rail project is 201,698 (196,903+4,795). With this information it is possible to find the annualisation factor which is 283 (57,064,229/196,903).

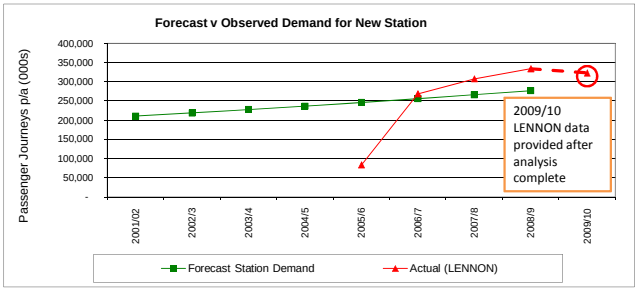
The information above allows us to calculate the annual demand for each station. The daily demand for new stations in 2001 is available in page 30 (Table 7.3.17). Total daily boarders and alighters for Larkhall in 2001 was 744. Upon applying the annualisation factor, total forecast demand for 2001 at Larkhall is 210,492.

The forecast demand available is for 2001. However, the actual project start date was December 2005. As the exogenous growth is not available in the documents provided, SDG assumes a 4% per annum growth rate for demand.

Station Usage Data	**2001/02**	**2002/3**	**2003/4**	**2004/5**	**2005/6**	**2006/7**	**2007/8**	**2008/9**	**2009/10**
Forecast Station Demand	210,492	218,912	227,668	236,775	246,246	256,096	266,339	276,993	
Actual (LENNON)					83,171	268,668	307,876	334,015	322,940
Actual (ORR)									

Comparison Commentary

The actual LENNON figure of 83,171 for 2005/6 is for year ending 31st March 2006. The start date of the project was 12th December 2005, hence, the actual demand in LENNON is only for approximately 4 months. The actual demand has exceeded the forecast demand from year 2. In 2008/09 the actual demand was 20% greater than forecast.



Modelling Technique Used

The model used is the Strathclyde Integrated Transport Model (SITM), a 4 stage transport model used for transport planning in conjunction with varying land use or roads and passenger transport network development scenarios. The core internal area covers the whole of the Clydeside conurbation and the external area covers the rest of UK.

The SITM consists a number of sub models; Car availability model, Trip end model, Trip distribution model, Model split model, Parking model, Highway assignment model, Public transport assignment model and an Economics model.

The trip distribution model produced matrices of person trips at the 24 hour level, split by car available and non car available.

The modal split model compared the costs of a journey by each mode, taking into account in vehicle time, walk time, wait time, and direct costs. A logit function was applied taking the utility values for each mode to give the proportions of trips made by each mode.

The public transport assignment model was used to determine by which alternative sub modes the public transport trips were made.

The modal split procedure was also run in the parking, highway assignment and public transport models.

The modal split pocedure was the primary linkage between the highway and public transport sides of the SITM. It took the 24 hour matrices of CA trips output from the distribution model and divided them into private and public transport users. The whole procedure involved iterative use of the modal split model, the city centre parking model, the highway assignment model and the public transport assignment model.

The modelling package was run for the 'base' case simulating the current 'do minimum' scenario. This includes the current base highway and public transport networks with only the committed schemes for future years coded. Afterwards, 'test' scenarios were run to simulate the network conditions.

Comments on appropriateness of modelling:

Key Endogenous Modelling Assumptions (trip rates, elasticities etc, state source where provided)

The planning data was supplied by all the local authorities within the SITM modelled area.
No information provided in the available documents

Comments on appropriateness of modelling:

Abstraction Modelled? (state abstracted stations, assumptions and abstraction forecasts)
Abstraction defined as a) stations within "catchment" and b) stations affected by additional calling point

The economic growth rate selected for the study was the mid point of the governments low and high forecasts for economic growth.
No additional information provided in the available documents

Comments on appropriateness of modelling:

Key Exogenous Modelling Assumptions (variables included, variable forecasts and elasticities)

No information provided in the available documents

Comments on appropriateness of modelling:

Demand Build-Up assumptions: Year 1 Year 2: Year 3: Year 4:

No information provided in the available documents

MERRYTON (LARKHALL LINE)

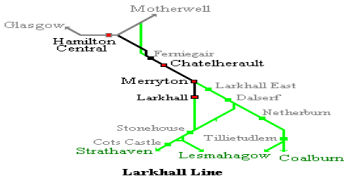
Opening Date **12th December 2005**

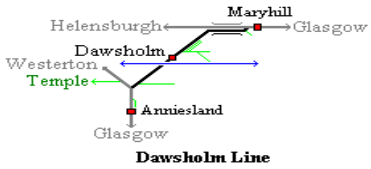
Description of Station:

Merryton railway station in Larkhall, Scotland is managed by First ScotRail and lies on the Argyle Line. The station was officially opened in December 2005, as part of the Larkhall branch which was re-opened at the same time. The station is located alongside the M74 and can be reached in 5 minutes by car thus making it a convenient option for Park and Ride.

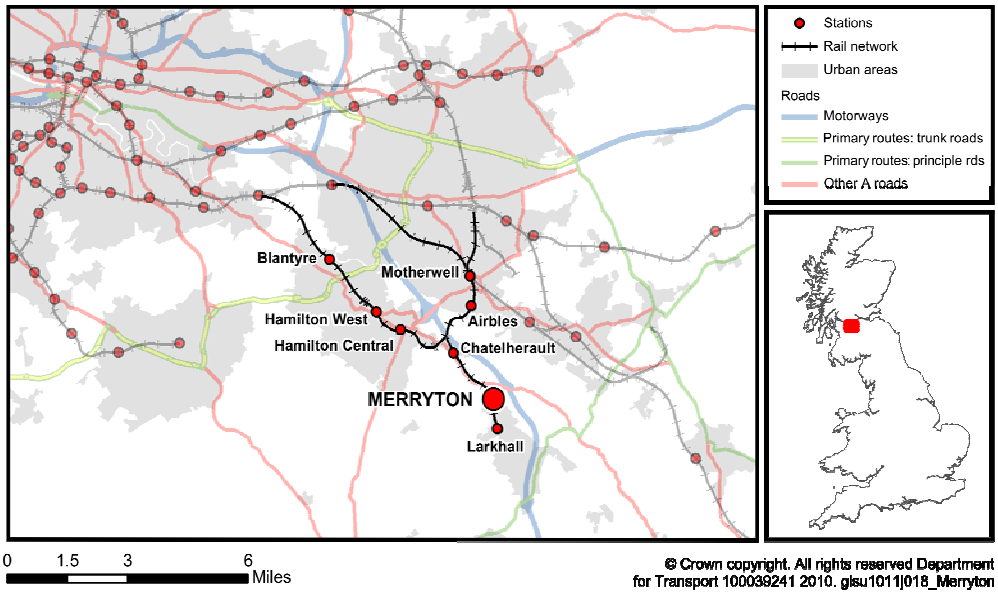
It is an unstaffed halt with ramp to single platform. There is a customer help point fitted with induction loop on the platform. The station has customer information monitors and CCTV.

The main elements of the Larkhall/Milngavie project was the opening of the Larkhall line between Haughhead Junction (Hamilton) and the former Larkhall central station (current Larkhall station) and the extension of the Northern suburban line from Maryhill station to Anniesland. The project was expected to assist in land use development and regeneration in the vicinity of the route corridor.





Source: Wikipedia / First ScotRail



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Summary Information	**Govt Office Region**	Scotland	**Station Facility Owner**	First ScotRail

Contact Information:

Other Contact Details (County Council or Promoter): Iain Wylie, Strathclyde Passenger Transport
Consort House, 12 West George Street, Glasgow G2 1HN
0141 333 3179

Station Categorisation

Other Residential
Park and Ride
Part of a new line opening

Station Accessibility

Public Transport The closest bus stops to Merryton rail station are within a couple of minutes walk of the station, approximately 150 meters. They are served by buses to Netherburn and East Kilbride (2 bph) and Birkenshaw and East Kilbride (2 bph).

Car (incl Car Parking) There is a local authority car park with 86 spaces including 5 for blue badge holders and 3 cycle racks.

Demand forecasts (and other information) prepared by: Paul Visser / Colin Morrison (Strathclyde Passenger Transport)
Contact Details: 0141 333 3284

Demand forecast source documents:
1) Modelling Report - Larkhall/Milngavie Rail Project (November 2000/February 2000)
Prepared by : Paul Visser / Colin Morrison
2) Larkhall to Milngavie PPP Project - Reappraisal of Investment Case 1999/00

Nominated Abstraction and Counterfactual Stations

Abstraction stations	Hamilton Central, Shieldmuir
Counterfactual stations	Hamilton West

MERRYTON : REVIEW OF DEMAND FORECASTS AND METHODOLOGY

Train Service

Planned Half hourly service over the route between Merryton and Partick and a quarter hourly day time frequency over the route between Milngavie and Patrick.

Actual 2 tph between Merryton and Partick leaving at 09 and 39 past the hour with an average journey time of 35 minutes.
4 tph between Partick and Milngavie leaving at 05,20,35 and 50 past the hour with an average journey time of 17 minutes.

Document title, page number and table number of forecast demand:
1) Modelling Report - Larkhall/Milngavie Rail Project (November 2000)

Forecasts of Producer only or Producer AND Attractor Trips?
SITM 3 Model forecasts demand. This sub model effectively converts population and social and economic developments, such as manufactoring and retail centres, into demand for travel to and from each zone. See Modelling Report Page17. It is therefore assumed that the forecasts are for Generated AND Attracted demand.

Observed demand shows that in 2008/9 17% of demand was accounted for by trips Attracted to Merryton

Method & assumptions used by SDG to convert demand forecast into same format (annual pax journeys) as LENNON station usage:
The total forecast rail demand with the Larkhall/Milngavie rail project is found in page 43 (Figure 3). This is a total of 57,064,229 boardings for 2001. The daily rail demand for the base case,'do minimum' is 196,903 (Page 23, Table 7.2.5). The increase in rail boardings after the project is 4,795 for 2001. Therefore the total daily boardings after the Larkhall/Milngavie rail project is 201,698 (196,903+4,795). With this information it is possible to find the annualisation factor which is 283 (57,064,229/196,903).

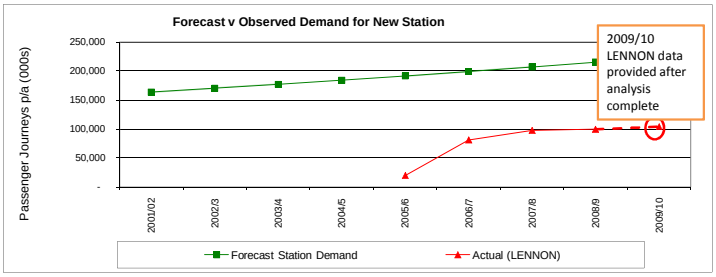
The information above allows us to calculate the annual demand for each station. The daily demand for new stations in 2001 is available in page 30 (Table 7.3.17). Total daily boarders and alighters for Merryton in 2001 was 578. Upon applying the annualisation factor, total forecast demand for 2001 at Merryton is 163,527.

The forecast demand available is for 2001. However, the actual project start date was December 2005. As the exogenous growth is not available in the documents provided, SDG assumes a 4% per annum growth rate for demand.

Growth Assumed pa 4%

Station Usage Data	**2001/02**	**2002/3**	**2003/4**	**2004/5**	**2005/6**	**2006/7**	**2007/8**	**2008/9**	**2009/10**
Forecast Station Demand	163,527	170,068	176,871	183,946	191,304	198,956	206,914	215,191	
Actual (LENNON)					19,940	81,100	97,597	99,500	103,977
Actual (ORR)									

Comparison Commentary
The actual demand at the station is less than half what was forecast.



Modelling Technique Used
The model used is the Strathclyde Integrated Transport Model (SITM), a 4 stage transport model used for transport planning in conjunction with varying land use or roads and passenger transport network development scenarios. The core internal area covers the whole of the Clydeside conurbation and the external area covers the rest of UK.

The SITM consists a number of sub models; Car availability model, Trip end model, Trip distribution model, Model split model, Parking model, Highway assignment model, Public transport assignment model and an Economics model.

The trip distribution model produced matrices of person trips at the 24 hour level, split by car available and non car available.

The modal split model compared the costs of a journey by each mode, taking into account in vehicle time, walk time, wait time, and direct costs. A logit function was applied taking the utility values for each mode to give the proportions of trips made by each mode.

The public transport assignment model was used to determine by which alternative sub modes the public transport trips were made.

The modal split procedure was also run in the parking, highway assignment and public transport models.

The modal split pocedure was the primary linkage between the highway and public transport sides of the SITM. It took the 24 hour matrices of CA trips output from the distribution model and divided them into private and public transport users. The whole procedure involved iterative use of the modal split model, the city centre parking model, the highway assignment model and the public transport assignment model.

The modelling package was run for the 'base' case simulating the current 'do minimum' scenario. This includes the current base highway and public transport networks with only the committed schemes for future years coded. Afterwards, 'test' scenarios were run to simulate the network conditions.

Comments on appropriateness of modelling:

Key Endogenous Modelling Assumptions (trip rates, elasticities etc, state source where provided)
The planning data was supplied by all the local authorities within the SITM modelled area.
No information provided in the available documents

Comments on appropriateness of modelling:

Abstraction Modelled? (state abstracted stations, assumptions and abstraction forecasts)
Abstraction defined as a) stations within "catchment" and b) stations affected by additional calling point
The economic growth rate selected for the study was the mid point of the governments low and high forecasts for economic growth.
No additional information provided in the available documents

Comments on appropriateness of modelling:

Key Exogenous Modelling Assumptions (variables included, variable forecasts and elasticities)
No information provided in the available documents

Comments on appropriateness of modelling:

Demand Build-Up assumptions:	Year 1	Year 2:	Year 3:	Year 4:
No information provided in the available documents				

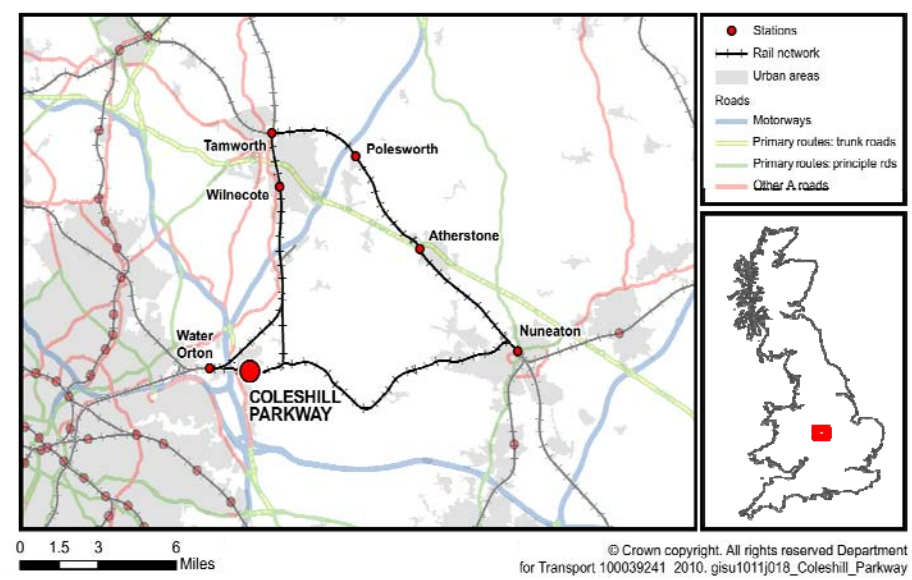
COLESHILL PARKWAY

Opening Date **19th August 2007**

Description of Station:
Coleshill Parkway is situated at Hams Hall, serving Coleshill, Warwickshire. The new station was originally scheduled to open in March 2007, though construction delays led to the station opening in August of that year. The station is currently operated by London Midland, though only served by CrossCountry trains.

The station is around half a mile from Jn 8 of the M42 and within two miles of the M6 and M6 Toll. The station is also around 500m from the BMW Hams Hall car plant which employs around 1,000 workers.

Source: Various internet sources (Wikipedia, BMW, Google Maps)



Summary Information **Govt Office Region** West Midlands **Station Facility Owner** John Laing Ltd (privately owned station)

Contact Information:

Other Contact Details (County Council or Promoter): Warwickshire County Council

Station Categorisation Park and Ride

(possibly also Destination : Work: BMW factory at Hams Hall - no specific mention of this in documentation but appears to be potential)

Station Accessibility

Public Transport The station incorporates a bus interchange providing four per hour direct Tamworth - Coleshill - Birmingham International Airport fast bus connections taking around fifteen minutes to the airport. (Source: Wikipedia)

Car (incl Car Parking) Easily accessed from the major roads network - half a mile from Jnc 8 of M42 and less tha ntwo miles from the M6 and M6 toll - easy access from Coventry & Rugby in the east and Warwick & Stratford further south via the M40.

240 space car park, operated by Meteor Parking Ltd.Open 24 hours. £2.50 per day Mon-Fri, £1.00 Weekends and BHs. - Currently running a Free Parking until March 2010 promotion

Demand forecasts (and other information) prepared by: There is no information on the identity of the consultants who prepared the original forecasts in the Jacobs report

Contact Details: The only references are to Warwickshire County Council themselves.

Demand forecast source documents: Jacobs Review of RPP Bid Submission and Economic Appraisal for SRA, January 2003

Nominated Abstraction and Counterfactual Stations

Abstraction stations	Nuneaton	Wilnecote	Water Orton
Counterfactual stations	Tamworth		

COLESHILL PARKWAY : REVIEW OF DEMAND FORECASTS AND METHODOLOGY

Train Service

Planned Approximately half-hourly Central Trains service with existing trains calling at the station. These would be Central Trains existing long distance services to/from Birmingham New Street.

Actual 2tph in each direction, two trains towards Leicester, Cambridge and Stansted Airport and two westbound to Birmingham New Street (18 mins journey time). The station is currently operated by London Midland, though only served by CrossCountry trains.

Document title, page number and table number of forecast demand:
Jacobs assessment spreadsheets - 'Coleshill Assessment.xls!Applicant Preferred Op (30 yrs)' Row42

Forecasts of Producer only or Producer AND Attractor Trips?
Jacobs' assessment of the scheme states that: "The Applicant has used PDFH based trip rate analysis to assess locally generated demand. Jacobs has undertaken independent trip rate analysis and confirms that these local estimates are not unreasonable....72% of the demand claimed in the Bid is, however, related to long distance railheading access. This is estimated applying a mode choice utility model to RSI data.". It is not clear from this whether Attractor trips are forecast, but the balance of probability is that they were not.

Observed demand shows that in 2008/9 23% of demand was accounted for by trips Attracted to Coleshill Parkway.

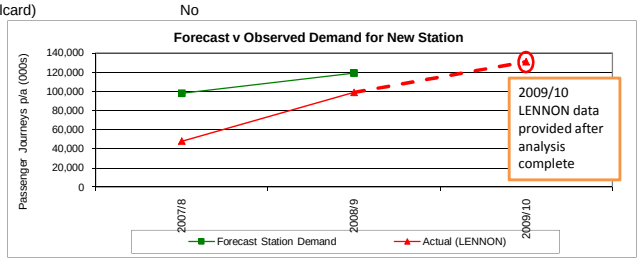
Method & assumptions used by SDG to convert demand forecast into same format (annual pax journeys) as LENNON station usage:

Taken directly from Jacobs documents

Station Usage Data	2007/8	2008/9	2009/10
Forecast Station Demand	98,000	119,000	
Actual (LENNON)	47,943	98,903	130,846
Actual (ORR)			

Is it known that some demand is excluded from LENNON/ORR? (eg Travelcard) No

Comparison Commentary
Both actual and forecast figures are still within a build up period of the first three years and the actual numbers are lower than the forecast as the station was only open for 7 1/2 months of the year. For 2008/09 the gap is narrowed with actual patronage within 20% of the forecasts.



Modelling Technique Used
Local demand was calculated using PDFH based trip rate analysis. Longer distance railheading access was calculated by applying a mode choice utility model to RSI data. 72% of total demand came from longer distance railheading.

Comments on appropriateness of modelling:
That 72% of total demand would come from railheading is an optimistic assumption. The Jacobs assessment states that whilst such a figure is not unprecedented (90% railheading at Birmingham International for example), it is surprisingly high for a non-Intercity station. Steer Davies Gleave concur with Jacobs' view.

Key Endogenous Modelling Assumptions (trip rates, elasticities etc, state source where provided)
The trip rate assumption used in the original demand forecasts were not mentionned in the Jacobs report. However Jacobs stated (in their review of the RPP bid) that the local trip rates are reasonable, having carried out independent trip rate analyses themselves.

Comments on appropriateness of modelling:

Abstraction Modelled? (state abstracted stations, assumptions and abstraction forecasts)
Abstraction defined as a) stations within "catchment" and b) stations affected by additional calling point

No information available

Comments on appropriateness of modelling:

One would certainly expect some abstraction from other stations, and it should have been possible to calculate given the method of forecasting demand.

Key Exogenous Modelling Assumptions (variables included, variable forecasts and elasticities)
Underlying demand growth is assumed as 0.5% per annum for the first 10 years.

Comments on appropriateness of modelling:
This growth rate was (at the time of the original RPP bid) a prudent assumption to make. However by 2004 it was clear that demand growth for commuting and leisure opportunities in Birmingham was growing considerably faster.

Demand Build-Up assumptions: Year 1 70% Year 2: 85% Year 3: 100% Year 4:

CORBY

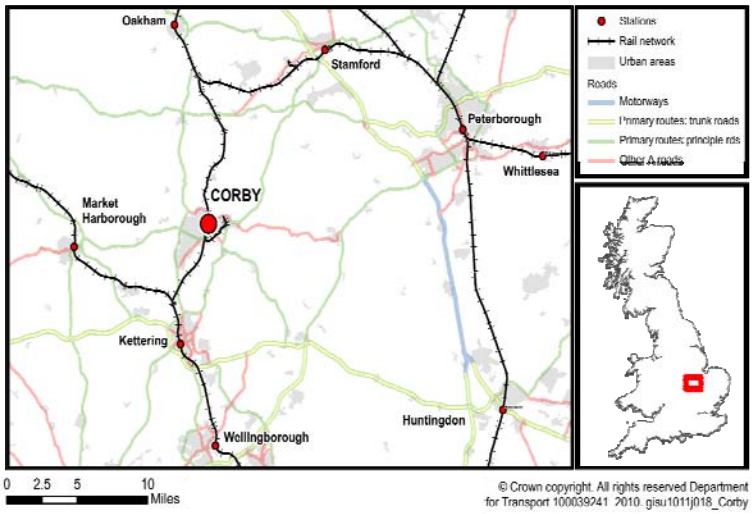
Opening Date **23rd February 2009**

Description of Station:

Corby is a railway station owned by Network Rail and managed by East Midlands Trains (EMT). The current station, opened on 23 February 2009, replaces the original closed in 1966 which was briefly reopened in 1987 with a shuttle service DMU from Kettering, only to close again in 1990.

Plans for the current station, built on a site adjacent to the original were approved in late 2007. The station opened with a single return train Monday - Friday whilst EMT awaited the additional trains required for the full service. The full service, which provides an hourly service to London commenced on 27 April 2009.

Source: Wikipedia



Summary Information **Govt Office Region** East Midlands **Station Facility O** Network Rail

Contact Information:

Other Contact Details (County Council or Promoter): Strategic Rail Authority

Station Categorisation Other Residential
Destination station: Work/Leisure
Part of a new line opening

Station Accessibility

Public Transport The station was built at Station Road adjacent to the site of the old station and acts as a transport interchange for Corby with bus and taxi facilities being relocated here.
A new road leads into the interchange which has a car park, taxi rank, drop-off and pick-up areas and a bus area.
A bus service links Corby with Kettering but transport is otherwise by car.

Car (incl Car Parking) Car park with 200 spaces north of Cottingham Road with pedestrian access via the station and car park access roads.

Demand forecasts (and other information) prepared by: Ove Arup & Partners Limited
Contact Details: 0207 636 1531

Demand forecast source documents:
1) Corby Rail Link Study-Summary Report (April 2004)
Prepared by:J Bailey, N Glavitsch, I Mobbs
2) Corby Rail Link Study-Appendices Report (March 2004)
Prepared by:J Bailey, N Glavitsch, I Mobbs

Nominated Abstraction and Counterfactual Stations

Abstraction stations Kettering, Peterborough
Counterfactual stations Market Harborough, Wellingborough

CORBY : REVIEW OF DEMAND FORECASTS AND METHODOLOGY

Train Service

Planned

Replace the existing 1tph from Derby to London during the peak with 1tph from Corby to London. Slow Nottingham service runs non-stop from Kettering to Luton, and a new hourly service calling at intermediate Midland Mainline stations south of Kettering between London and Corby added.

This will improve journey times for longer distance passengers, but would reduce network connectivity to Wellingborough and Bedford from stations north of Kettering.

Journey times from selected stations to London are reduced by about 3 minutes (for example, Nottingham, Leicester and Kettering). However, the removal of the stops at Wellingborough and Bedford mean a small number of passengers incur an additional interchange, for example, Bedford to Mansfield or Nottingham. Passengers incur an additional journey time of up to 50 minutes.

The expected journey time to London is 1 hour 10 minutes and the expected journey time from London to Corby is 1 hour 16 minutes.

Actual

East Midlands Trains runs fast, direct trains from Corby train station to London St Pancras every hour (Monday-Saturday). Approximate average journey time from Corby is 1 hour 14 minutes while the approximate average journey time to Corby is 1 hour 11 minutes. Southbound trains from Corby serve Kettering, Wellingborough, Bedford and Luton and departs Corby at 15 or 42 past the hour. The northbound service from London calls at Bedford, Wellingborough, Kettering and Corby before continuing on to Melton Mowbray and departs London every hour.

It should be noted that travel to Corby in the morning peak and from Corby in the pm peak requires an interchange at Ketting (as there are no through contra-peak trains) - however the journey time remains c 1hr 15 mins (although the GJT would be higher).

There is an hourly service from Bedford to Nottingham with an approximate average journey time of 1 hour 19 minutes.

Document title, page number and table number of forecast demand:

1) Corby Rail Link Study-Summary Report (Page 23, Table 4.2)
2) Corby Rail Link Study-Summary Report (Page 16, Table 3.2)

Forecasts of Producer only or Producer AND Attractor Trips?

Trip rates are based on housing and employment. We have assumed that the forecasts are therefore fo both Producer and Attractor. 'The housing and employment projections produced by Catalyst Corby, and the wider growth projections for the MKSM area were incorporated in the demand forecasting model to review whether a business case for new rail services existed.' PAGE 2 CORBY RAIL LINK STUDY-SUMMARY REPORT. We used the medium trip rate scenario.

No information is yet available on observed demand: however when data is available forecasts should be compared with the sum of Producer and Attractor journeys

Method & assumptions used by SDG to convert demand forecast into same format (annual pax journeys) as LENNON station usage:

Table 4.2 in the Summary report provides the daily and annual rail demand to/from Corby for 2016. The annualisation factor was derived by dividing the total annual demand by the daily demand. Table 3.2 provides the daily trip rates for 2006 and every fifth year till 2031. The daily trip rates were multiplied by the annualisation factor 300 to arrive at the annual demand. So for 2006, the medium daily trip rate of 954 was multiplied by 300 to gove 286,200.

The years 2007 - 2010 have been infilled by SDG, assuming constant growth between 2006 - 2011: this implicitly ignores any proper build-up assumptions

Comments on Actual Demand Data:

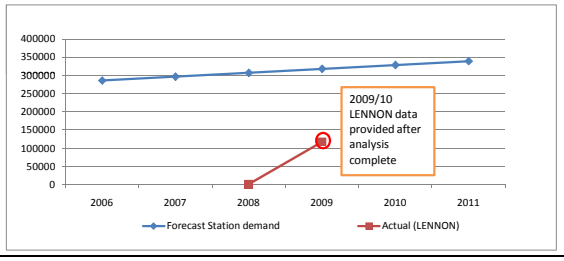
As the station was only open for the last 5 weeks of the financial year 2008/9, with a much reduced service, it is not appropriate to factor up the demand for this period to represent a full year of demand.

Station Usage Data

	2006	2007	2008	2009	2010	2011
Forecast Station demand	286200	296760	307320	317880	328440	339000
Actual (LENNON)			1486	117890		
Actual (ORR)						

Comparison Commentary

The forecast figures were only available for 2006 and every fifth year from then till 2031. The annual demand was obtained as described above. The actual figures are only available for 2008/9 (in which financial year the station was only open for one month) - hence it was considered inappropriate to annualise the actual demand.



Modelling Technique Used

Three different modelling techniques were used to forecast the rail demand and revenue arising from the introduction of Corby station. The fourth technique LSMMS was tested but not used.
A trip rate model was developed to forecast rail demand for the different combination of service patterns and growth scenarios.
A MOIRA model was used to estimate the impact of service changes (increased journey time) on demand on existing services.

Given the proximity of Kettering to Corby, a Station Access Model was developed to assess the distribution of demand between the different stations.

The fourth approach which was only tested was a spreadsheet model developed by the consultants that incorporates data from the London to South Midlands Multi Modal Study (LSMMS). The LSMMS car trip matrices demonstrated limited evidence of trip re-distribution to / from Corby resulting from the new housing and employment. They were therefore not included in the financial and economic appraisal. New rail demand from Corby was calculated using the trip rate methodology.

Comments on appropriateness of modelling:

Key Endogenous Modelling Assumptions (trip rates, elasticities etc, state source where provided)

The following trip rates were selected to give a low, medium and high growth scenarios for Corby

low – 4.74 trips per person pa, medium – 8.31 trips per person pa, high – 10.96 trips per person pa. The combined trip rates for 1tph were calculated in five yearly increments based on forecasts of housing construction in Corby. The housing completion rates and average occupancy were derived from the Milton Keynes South Midlands (MKSM) study.

Assumption for medium trip rate scenario: trip rate for 20% of the existing population in Corby is assumed to be unchanged. Remaining 80% of the existing population assumed to adopt low trip rate until 2016, and a medium trip rate thereafter. New population assumed to adopt medium trip rate throughout appraisal period.

Comments on appropriateness of modelling:

As the medium growth scenario was chosen for the preferred option the assumtions for this scenario may be found above.

Abstraction Modelled? (state abstracted stations, assumptions and abstraction forecasts)
Abstraction defined as a) stations within "catchment" and b) stations affected by additional calling point

A Midlands version of MOIRA was used to evaluate the impact of the new trains to / from Corby on existing services.
A Station Access Model was used to understand the factors that affect station choice given the proximity of Kettering and Corby.

Comments on appropriateness of modelling:

Key Exogenous Modelling Assumptions (variables included, variable forecasts and elasticities)

In order to determine the future social profile of Corby and likely travel patterns, there was a need to find a suitable comparator and Kettering was identified as a potential benchmark. Due to its close proximity with Kettering, Corby could have broadly similar trip characteristics.

The trend growth rate for 2016 was 26% and 54% for 2031

Comments on appropriateness of modelling:

Demand Build-Up assumptions: Year 1 Year 2: Year 3: Year 4:

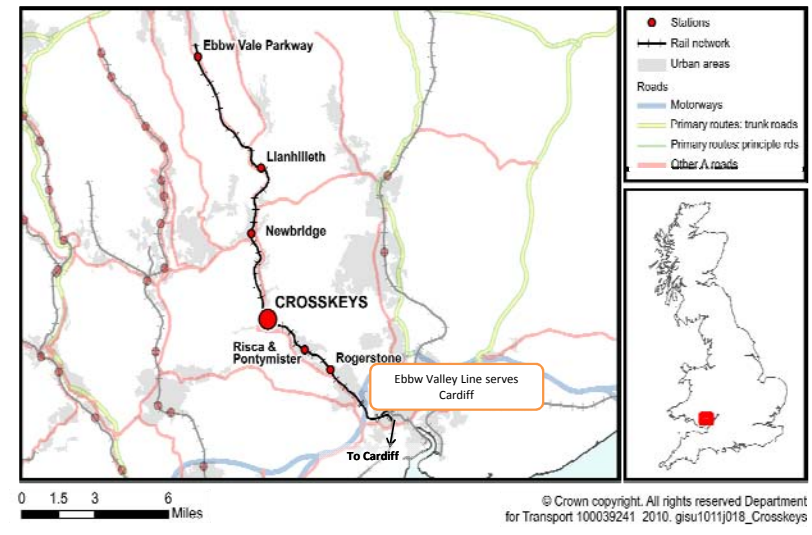
CROSSKEYS (EBBW VALLEY LINE)

Opening Date **7th June 2008**

Description of Station:
Crosskeys railway station is on the Ebbw Valley Line. The station is situated near the former station site, behind houses on Risca Road and Carlton Terrace. The access to the station is via a one-way system off High Street exiting via Carlton Terrace. Crosskeys is a two-platform station with no car park. The station provides good access to the town and the local college as well as being near local bus links.

The station marks the end of the double-track passing loop between Risca and Crosskeys, upon leaving Crosskeys trains enter the single track which extends to the rail head in Ebbw Vale Parkway. The station opened on 7 June 2008, four months after services between Cardiff Central and Ebbw Vale Parkway railway station commenced.

Source: Wikipedia



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Summary Information	**Govt Office Region**	Welsh Assembly Government	**Station Facility Owner**	Arriva Trains Wales

Contact Information:

Other Contact Details (County Council or Promoter): Peter Slater, Director of Environment and Development, Blaenau Gwent County Borough Council

01495 355701

Station Categorisation Other Residential
Part of a new line opening

Station Accessibility

Public Transport

Car (incl Car Parking) No car paking or cycle parking detailed on NR website

Demand forecasts (and other information) prepared by: Steer Davies Gleave
Contact Details: Steve Hunter
0113 389 6400

Demand forecast source documents:

Ebbw Vale RPP Formal Bid Volume 1.pdf Ebbw Vale RPP Formal Bid Volume 2.pdf Phase One Demand & Appraisal spreadsheets	Both held at: \\Douglas\Work\Projects\Projects\222\2\73\01\External Inputs\Client\SDG\Ebbw Vale 18 .xls files stored at: \\Douglas\Work\Projects\Projects\222\2\73\01\External Inputs\Client\SDG\Ebbw Vale\Phase One

Nominated Abstraction and Counterfactual Stations

Abstraction stations	None: Crosskeys is on a new line and in a valley, with no reasonable roads to locations with existing stations
Counterfactual stations	See above

CROSSKEYS (EBBW VALLEY LINE) : REVIEW OF DEMAND FORECASTS AND METHODOLOGY

Train Service

Planned The business case was for the phased introduction of a 1tph Cardiff service (2005 original opening date) followed by a 1tph Newport service when Network Rail works to the station allowed it (2009 as stated in the Business Case documents).

Actual Infrastructure was planned to accommodate both phases but was trimmed back (without SDG involvement - info sourced from Steve Hunter) and what was built only allows a single train per hour. At present therefore, only the 1tph to Cardiff is running. Journey time is 35 minutes

Document title, page number and table number of forecast demand:
Business case documents inlcude only demand estimates for the whole Ebbw Valley line and assuming the addition of Phase 2 to Newport in 2009. The original demand modelling and appraisal spreadsheets were used to calculate figures on a station by station basis and for Phase 1 only.

Forecasts of Producer only or Producer AND Attractor Trips?
Producer and attractor trips are forecast

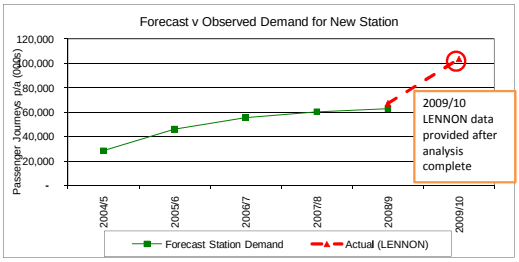
Observed demand shows that in 2008/9 23% of demand was accounted for by trips Attracted to Crosskeys.

Method & assumptions used by SDG to convert demand forecast into same format (annual pax journeys) as LENNON station usage:
A suite of spreadsheets were supplied from which the appraisal demand figures were calculated. The original work calculated base journeys figures for each station using a logit models to estimate mode shift from car and bus with demand split into work/non work and peak/off peak segments (i.e. four in total). These station by station numbers were aggregated up to a smaller number of sectors (e.g. Valley North, Valley South, New Port, Cardiff etc..) and various growth factors applied at the sector level. To produce annual pax journeys on a station by station basis, the station by station numbers were taken from teh logit models and the relevant growth factors applied based on a lookup between stations and sectors from the original spreadsheets. The original demand ramp up assumptions were also applied to each station. These figures have been validated by checking the totals against the total for the whole Ebbw Valley line from the final appraisal spreadsheets.

Station Usage Data	2004/5	2005/6	2006/7	2007/8	2008/9	2009/10
Forecast Station Demand	28,505	46,121	55,617	60,380	62,982	
Actual (LENNON)					67,347	103,755
Actual (ORR)						

Is it known that some demand is excluded from LENNON/ORR? (eg Travelcard)

Comparison Commentary
Given the status of the station at the end of a new line, the do-minimum was zero. The original business case assumed an opening year of 2004/05. In reality, the line did not reopen until February 2008. In the first year of opening, patronage was 7% higher than the forecast for 2008/09. Given demand will be subject to build-up in reality one would expect that demand next year will be considerably higher than forecast.



Modelling Technique Used
The modelling approach was split into three main elements -
i) a demand and revenue mode choice model
ii) a model that forecasts generated demand AND underlying rail growth
iii) an appraisal model

Two spreadsheet based logit models were used to calculate mode shift from car and bus to the new rail service. These models calculated mode choice probailities from generalised cost differences. The basedata for the logit models was locally collected from stated preference surveys carried out in October 2000. Over 1,000 interviews were carried out with regular travellers in the valley

The future year forecasting model estimated patronage and revenue for future years based on a number of demand/revenue drivers (detailed below). This model also included an estimate of 'generated demand' to allow for trips that were previously not made but had been made possible or more attractive by the new rail service. Generated demand was estimated by assuming that over the first 4 years of the project EITHER an additonal 17% or 30% demand was generated (depending on the OD pair). How these uplifts were arrived at is unclear (information is being sought).

The future year demand and evenue estimates were fed into the appraisal model which calculated the scheme's value for money across the 60 year appraisal period and took into account costs and wider scheme benefits]

Comments on appropriateness of modelling:

The basic approach to the modelling work is sound. The use of the trip rate model to estimate shift from car and bus (the two main competing modes) and growing these figures using a number of exogenous growth assumptions seems sensible. The assumptions used to calculate the level of shift from other modes and the amount of generated demand appear to be the key issues here

The lack of information on how generated trips were estimated is a cause for concern.

Key Endogenous Modelling Assumptions (trip rates, elasticities etc, state source where provided)
Trip rates: The base market for transfer from car was established using RSIs carried out for the study and supplemented by RSI data supplied by Gwent Consultancyfrom previous research for the M4 corridor. Movements where no rail alternative was possible were removed to create an 'in scope' car market. The base market for bus was calculated using ETM data for bus routes where rail would be an alternative (Appendix C, C1.3)

Logit model assumptions: The two logit models (car-to-rail and bus-to-rail choice models) were developed using local parameters derived from stated preference surveys carried out in Oct 2000. Over 1,000 interviews were carried out with regular travellers from the valley. The interviews were aimed at ascertaining their likelihood of changing mode based on changes in journey time, fare, and access/egress/wait times (Appendix C, C1.5)
Value of time and wait and access time wieghts were derived from the SP interviews. (VoT £2.07-£3.82 per hr for car, £0.31 to £0.60 for bus (Appendix C, Table C6)

Generalised time matrices for each OD pair were produced for each mode (car, bus, rail) and sub-mode (walk access, feeder bus accesss, car access to rail) using car and bus journey time information and data from the Trip rate modelling and SP surveys

The share of the overall car matrix forecast to transfer to rail was 3%, for bus the switch to rail was 11% (Appendix C, C2.37-2.39)

Comments on appropriateness of modelling:
The modelling methodology appears to be sound, however a 3% shift from car to rail (remembering that the car matrix was solely for those trips that hada a rail alternative) seems quite low.

The fact that it is not clear what the source is of the 17% or 30% uplift for generated trips is a cause for concern. A figure of 17% appears rather low, 30%+ would appear more realistic

Abstraction Modelled? (state abstracted stations, assumptions and abstraction forecasts)
Abstraction defined as a) stations within "catchment" and b) stations affected by additional calling point
Given the location of the stations on a new line, there was no abstraction modelled from other stations

Comments on appropriateness of modelling:

Key Exogenous Modelling Assumptions (variables included, variable forecasts and elasticities)
The model drew heavily on PDFH recommendations for the bulk of the exogenous modelling assumptions (Appendix C, C3.3)
GDP growth and employment growth were both assumed to be higher than the recommended RIFF values. It was reasoned that the valley would experience greater than average growth given the relatively lower base (due to high unemployment and lower econmic activity in the area). An additional time trend of 3% p.a. was added to employment growth and 1% added to GDP growth to reflect these assumptions (Appendix C, Section C3)

Comments on appropriateness of modelling:
The modelling assumptions should have produced a higher than average growth rate. This does not tally with the low forecasts compared with actuals.

Demand Build-Up assumptions:	Year 1	60%	Year 2:	90%	Year 3:	100%	Year 4:

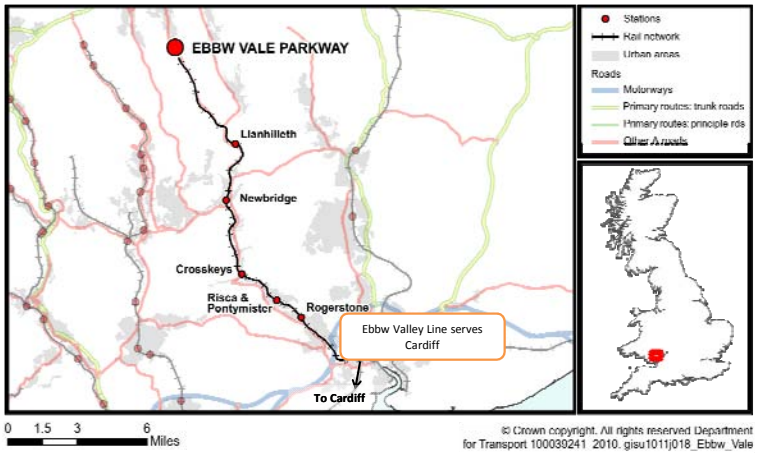
EBBW VALE PARKWAY (EBBW VALLEY LINE)

Opening Date **6th February 2008**

Description of Station:
Ebbw Vale Parkway railway station is the terminus of the Ebbw Valley Line. The station opened on 6 February 2008 when services to and from Cardiff Central commenced after 46 years of being a freight-only line. Future plans included extending services to Ebbw Vale Town and an hourly service to Newport.

The station has been built on a site close to the former Victoria station in the Victoria area of the Ebbw Vale conurbation. It consists of a single platform adjacent to Glan Ebbw Terrace, close to the A4046 Station Road.

Source: Wikipedia



Summary Information **Govt Office Region** Welsh Assembly Government **Station Facility Owner** Arriva Trains Wales

Contact Information:

Other Contact Details (County Council or Promoter): Peter Slater, Director of Environment and Development, Blaenau Gwent County Borough Council

01495 355701

Station Categorisation Park and Ride
Part of a new line opening

Station Accessibility

Public Transport Upon opening, there was a dedicated 'rail linc' bus that connected with incoming trains. The bus operated from the station to Rassau via Ebbw Vale town centre, Ebbw Vale Civic Centre, Ebbw Vale College, Morrsions and Rhyd-y-blew. This service was provided by Clarkes Coaches and was free to rail ticket holders.This serviced ceased operation on 1 April 2009 due to a lack of funding. Bus stops are also located on the nearby A4046 and provide access to services to nearby communities such as Cwm and the Garden Festival Shopping site.

Car (incl Car Parking) Local authority operated car park - 100 spaces inc 7 disabled spaces
Cycle parking for 6 bicycles

Demand forecasts (and other information) prepared by: Steer Davies Gleave
Contact Details: Steve Hunter
0113 389 6400

Demand forecast source documents:
Ebbw Vale RPP Formal Bid Volume 1.pdf
Ebbw Vale RPP Formal Bid Volume 2.pdf
Both held at: \\Douglas\Work\Projects\Projects\222\2\73\01\External Inputs\Client\SDG\Ebbw Vale

Phase One Demand & Appraisal spreadsheets
18 .xls files stored at: \\Douglas\Work\Projects\Projects\222\2\73\01\External Inputs\Client\SDG\Ebbw Vale\Phase One

Nominated Abstraction and Counterfactual Stations

Abstraction stations Abergavenny, Rhymney
Counterfactual stations Tir-phil, Brithdir, Bargoed, *Cwmbran*

EBBW VALE PARKWAY (EBBW VALLEY LINE) : REVIEW OF DEMAND FORECASTS AND METHODOLOGY

Train Service

Planned

The business case was for the phased introduction of a 1tph Cardiff service (2005 original opening date) followed by a 1tph Newport service when Network Rail works to the station allowed it (2009 as stated in the Business Case documents). A journey time of 55 mins was assumed

Actual

Infrastructure was planned to accommodate both phases but was trimmed back (without SDG involvement - info sourced from Steve Hunter) and what was built only allows a single train per hour. At present therefore, only the 1tph to Cardiff is running

Document title, page number and table number of forecast demand:

Business case documents inlcude only demand estimates for the whole Ebbw Valley line and assuming the addition of Phase 2 to Newport in 2009. The original demand modelling and appraisal spreadsheets were used to calculate figures on a station by station basis and for Phase 1 only.

Forecasts of Producer only or Producer AND Attractor Trips?

Producer and attractor trips are forecast

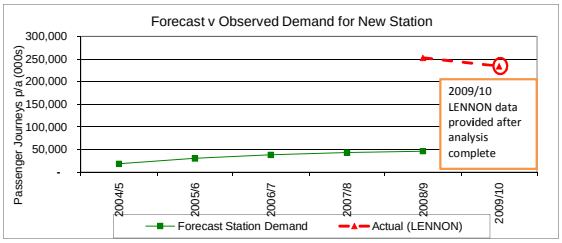
Observed demand shows that in 2008/9 14% of demand was accounted for by trips Attracted to Ebbw Vale Parkway.

Method & assumptions used by SDG to convert demand forecast into same format (annual pax journeys) as LENNON station usage:

A suite of spreadsheets were supplied from which the appraisal demand figures were calculated. The original work calculated base journeys figures for each station using a logit models to estimate mode shift from car and bus with demand split into work/non work and peak/off peak segments (i.e. four in total). These station by station numbers were aggregated up to a smaller number of sectors (e.g. Valley North, Valley South, New Port, Cardiff etc..) and various growth factors applied at the sector level. To produce annual pax journeys on a station by station basis, the station by station numbers were taken from teh logit models and the relevant growth factors applied based on a lookup between stations and sectors from the original spreadsheets. The original demand ramp up assumptions were also applied to each station. These figures have been validated by checking the totals against the total for the whole Ebbw Valley line from the final appraisal spreadsheets.

Station Usage Data	2004/5	2005/6	2006/7	2007/8	2008/9	2009/10
Forecast Station Demand	18,057	30,031	37,821	42,930	45,858	
Actual (LENNON)					252,607	234,138
Actual (ORR)						

Is it known that some demand is excluded from LENNON/ORR? (eg Travelcard)



Comparison Commentary

Given the status of the station at the end of a new line, the do-minimum was zero. The original business case assumed an opening year of 2004/05. In reality, the line did not reopen until February 2008. The service has performed at an order of magnitude above the forecast demand for the line. Ebbw Vale Parkway itself saw over 250,000 entries and exits in its first full year of operation compared to a forecast of just under 30k based on the station running for five years in the original forecasts

Modelling Technique Used

The modelling approach was split into three main elements -
i) a demand and revenue mode choice model
ii) a model that forecasts generated demand AND underlying rail growth
iii) an appraisal model
Two spreadsheet based logit models were used to calculate mode shift from car and bus to the new rail service. These models calculated mode choice probabilities from generalised cost differences. The base data for the logit models was locally collected from stated preference surveys carried out in October 2000. Over 1,000 interviews were carried out with regular travellers in the valley

The future year forecasting model estimated patronage and revenue for future years based on a number of demand/revenue drivers (detailed below). This model also included an estimate of 'generated demand' to allow for trips that were previously not made but had been made possible or more attractive by the new rail service. Generated demand was estimated by assuming that over the first 4 years of the project EITHER an additonal 17% or 30% demand was generated (depending on the OD pair). How these uplifts were arrived at is unclear.

The future year demand and revenue estimates were fed into the appraisal model which calculated the scheme's value for money across the 60 year appraisal period and took into account costs and wider scheme benefits]

Comments on appropriateness of modelling:

The basic approach to the modelling work is sound. The use of the trip rate model to estimate shift from car and bus (the two main competing modes) and growing these figures using a number of exogenous growth assumptions seems sensible. The assumptions used to calculate the level of shift from other modes and the amount of generated demand appear to be the key issues here

The lack of information on how generated trips were estimated is a cause for concern.

Key Endogenous Modelling Assumptions (trip rates, elasticities etc, state source where provided)

Trip rates: The base market for transfer from car was established using RSIs carried out for the study and supplemented by RSI data supplied by Gwent Consultancy from previous research for the M4 corridor. Movements where no rail alternative was possible were removed to create an 'in scope' car market. The base market for bus was calculated using ETM data for bus routes where rail would be an alternative (Appendix C, C1.3)

Logit model assumptions: The two logit models (car-to-rail and bus-to-rail choice models) were developed using local parameters derived from stated preference surveys carried out in Oct 2000. Over 1,000 interviews were carried out with regular travellers from the valley. The interviews were aimed at ascertaining their likelihood of changing mode based on changes in journey time, fare, and access/egress/wait times (Appendix C, C1.5)

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Generalised time matrices for each OD pair were produced for each mode (car, bus, rail) and sub-mode (walk access, feeder bus accesss, car access to rail) using car and bus journey time information and data from the Trip rate modelling and SP surveys

The share of the overall car matrix forecast to transfer to rail was 3%, for bus the switch to rail was 11% (Appendix C, C2.37-2.39)

Comments on appropriateness of modelling:

The modelling methodology appears to be sound, however a 3% shift from car to rail (remembering that the car matrix was solely for those trips that hada a rail alternative) seems quite low.

The fact that it is not clear what the source is of the 17% or 30% uplift for generated trips is a cause for concern. A figure of 17% appears rather low, 30%+ would appear more realistic

Abstraction Modelled? (state abstracted stations, assumptions and abstraction forecasts)
Abstraction defined as a) stations within "catchment" and b) stations affected by additional calling point

Given the location of the stations on a new line, there was no abstraction modelled from other stations

Comments on appropriateness of modelling:

Key Exogenous Modelling Assumptions (variables included, variable forecasts and elasticities)

The model drew heavily on PDFH recommendations for the bulk of the exogenous modelling assumptions (Appendix C, C3.3)
GDP growth and employment growth were both assumed to be higher than the recommended RIFF values. It was reasoned that the valley would experience greater than average growth given the relatively lower base (due to high unemployment and lower econmic activity in the area). An additional time trend of 3% p.a. was added to employment growth and 1% added to GDP growth to reflect these assumptions (Appendix C, Section C3)

Comments on appropriateness of modelling:

The modelling assumptions should have produced a higher than average growth rate. This does not tally with the low forecasts compared with actuals.

Demand Build-Up assumptions: Year 1 60% Year 2: 90% Year 3: 100% Year 4:

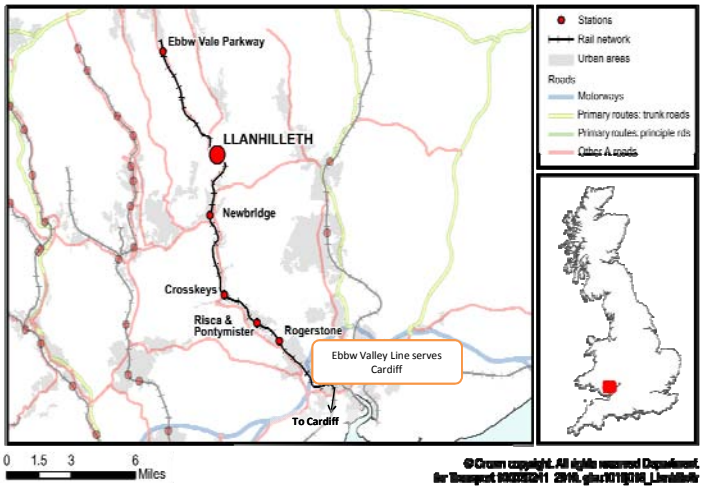
LLANHILLETH (EBBW VALLEY LINE)

Opening Date **27th April 2008**

Description of Station:

Llanhilleth railway station is situated on the Ebbw Valley Line and serves the village of Llanhilleth, South Wales. The station at Llanhilleth is situated, to the rear of properties on Commercial Road and opposite Railway Street, near the former station location. Access to the station and car park is provided off Commercial Road. The station currently has a single platform to serve both directions.

Source: Wikipedia



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Summary Information	**Govt Office Region**	Welsh Assembly Government	Station Facility Owner	Arriva Trains Wales

Contact Information:

Other Contact Details (County Council or Promoter): Peter Slater, Director of Environment and Development, Blaenau Gwent County Borough Council

01495 355701

Station Categorisation

Other Residential
Destination station: Airport
Part of a new line opening

It is not believed that there is an airport nearby

Station Accessibility

Public Transport Upon opening, there was a dedicated 'rail linc' bus that connected with incoming trains. The bus operated half-hourly between the station and Abertillery via Six Bells.. This service was provided by Henleys Buses and was free to rail ticket holders.This serviced ceased operation on 1 April 2009 due to a lack of funding. Bus stops are also located on the nearby A4046 and provide access to services to nearby communities such as Cwm and the Garden Festival Shopping site.

Car (incl Car Parking) Local authority operated car park - 52spaces
Cycle parking for 6 bicycles

Demand forecasts (and other information) prepared by: Steer Davies Gleave
Contact Details: Steve Hunter
0113 389 6400

Demand forecast source documents: Ebbw Vale RPP Formal Bid Volume 1.pdf
Ebbw Vale RPP Formal Bid Volume 2.pdf
Phase One Demand & Appraisal spreadsheets

Nominated Abstraction and Counterfactual Stations

Abstraction stations Pontypool
Counterfactual stations Cwmbran

LLANHILLETH (EBBW VALLEY LINE) : REVIEW OF DEMAND FORECASTS AND METHODOLOGY

Train Service

Planned The business case was for the phased introduction of a 1tph Cardiff service (2005 original opening date) followed by a 1tph Newport service when Network Rail works to the station allowed it (2009 as stated in the Business Case documents).

Actual Infrastructure was planned to accommodate both phases but was trimmed back (without SDG involvement - info sourced from Steve Hunter) and what was built only allows a single train per hour. At present therefore, only the 1tph to Cardiff is running. Jounrey time is 49 minutes

Document title, page number and table number of forecast demand:

Business case documents inlcude only demand estimates for the whole Ebbw Valley line and assuming the addition of Phase 2 to Newport in 2009. The original demand modelling and appraisal spreadsheets were used to calculate figures on a station by station basis and for Phase 1 only. "Llanhilleth" was not included as a station in these forecasts, instead they were calculated fro Aberbeeg (a former station), which is c600m away from the Llanhilleth site. Forecasts for Aberbeeg have therefore been assumed to be transferable to Llanhilleth.

Forecasts of Producer only or Producer AND Attractor Trips?

Producer and attractor trips are forecast

Observed demand shows that in 2008/9 23% of demand was accounted for by trips Attracted to Llanhilleth.

Method & assumptions used by SDG to convert demand forecast into same format (annual pax journeys) as LENNON station usage:

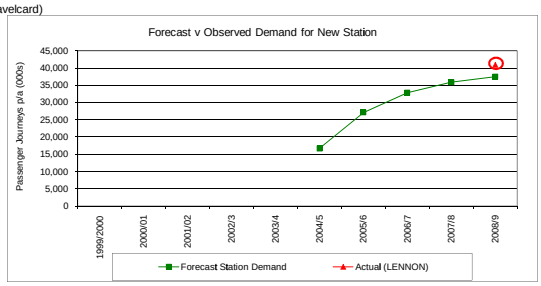
A suite of spreadsheets were supplied from which the appraisal demand figures were calculated. The original work calculated base journeys figures for each station using a logit models to estimate mode shift from car and bus with demand split into work/non work and peak/off peak segments (i.e. four in total). These station by station numbers were aggregated up to a smaller number of sectors (e.g. Valley North, Valley South, New Port, Cardiff etc..) and various growth factors applied at the sector level. To produce annual pax journeys on a station by station basis, the station by station numbers were taken from teh logit models and the relevant growth factors applied based on a lookup between stations and sectors from the original spreadsheets. The original demand ramp up assumptions were also applied to each station. These figures have been validated by checking the totals against the total for the whole Ebbw Valley line from the final appraisal spreadsheets.

Station Usage Data	1999/2000	2000/01	2001/02	2002/3	2003/4	2004/5	2005/6	2006/7	2007/8	2008/9
Forecast Station Demand						16,683	27,100	32,856	35,873	37,529
Actual (LENNON)										40,967
Actual (ORR)										

Is it known that some demand is excluded from LENNON/ORR? (eg Travelcard)

Comparison Commentary

Given the status of the station at the end of a new line, the do-minimum was zero. The original business case assumed an opening year of 2004/05. In reality, the line did not reopen until 2008. The first year of opening is 9% higher than the forecast 2008/09 usage. This is with five years of operation in the forecasts and it could be assumed that there will be some ramp up of the actual figures over the first few years so the forecasts appear to be on the low side.



Modelling Technique Used

The modelling approach was split into three main elements -
i) a demand and revenue mode choice model
ii) a model that forecasts generated demand AND underlying rail growth
iii) an appraisal model

Two spreadsheet based logit models were used to calculate mode shift from car and bus to the new rail service. These models calculated mode choice probaiilities from generalised cost differences. The basedata for the logit models was locally collected from stated preference surveys carried out in October 2000. Over 1,000 interviews were carried out with regular travellers in the valley

The future year forecasting model estimated patronage and revenue for future years based on a number of demand/revenue drivers (detailed below). This model also included an estimate of 'generated demand' to allow for trips that were previously not made but had been made possible or more attractive by the new rail service. Generated demand was estimated by assuming that over the first 4 years of the project EITHER an additonal 17% or 30% demand was generated (depending on the OD pair). How these uplifts were arrived at is unclear.

The future year demand and evenue estimates were fed into the appraisal model which calculated the scheme's value for money across the 60 year appraisal period and took into account costs and wider scheme benefits]

Comments on appropriateness of modelling:

The basic approach to the modelling work is sound. The use of the trip rate model to estimate shift from car and bus (the two main competing modes) and growing these figures using a number of exogenous growth assumptions seems sensible. The assumptions used to calculate the level of shift from other modes and the amount of generated demand appear to be the key issues here

The lack of information on how generated trips were estimated is a cause for concern.

Key Endogenous Modelling Assumptions (trip rates, elasticities etc, state source where provided)

Trip rates: The base market for transfer from car was established using RSIs carried out for the study and supplemented by RSI data supplied by Gwent Consultancyfrom previous research for the M4 corridor. Movements where no rail alternative was possible were removed to create an 'in scope' car market. The base market for bus was calculated using ETM data for bus routes where rail would be an alternative (Appendix C, C1.3)

Logit model assumptions: The two logit models (car-to-rail and bus-to-rail choice models) were developed using local parameters derived from stated preference surveys carried out in Oct 2000. Over 1,000 interviews were carried out with regular travellers from the valley. The interviews were aimed at ascertaining their likelihood of changing mode based on changes in journey time, fare, and access/egress/wait times (Appendix C, C1.5)

Value of time and wait and access time wieghts were derived from the SP interviews. (VoT £2.07-£3.82 per hr for car, £0.31 to £0.60 for bus (Appendix C, Table C6)

Generalised time matrices for each OD pair were produced for each mode (car, bus, rail) and sub-mode (walk access, feeder bus accesss, car access to rail) using car and bus journey time information and data from the Trip rate modelling and SP surveys

The share of the overall car matrix forecast to transfer to rail was 3%, for bus the switch to rail was 11% (Appendix C, C2.37-2.39)

Comments on appropriateness of modelling:

The modelling methodology appears to be sound, however a 3% shift from car to rail (remembering that the car matrix was solely for those trips that hada a rail alternative) seems quite.

The fact that it is not clear what the source is of the 17% or 30% uplift for generated trips is a cause for concern. A figure of 17% appears rather low, 30%+ would appear more realistic

Abstraction Modelled? (state abstracted stations, assumptions and abstraction forecasts)
Abstraction defined as a) stations within "catchment" and b) stations affected by additional calling point

Given the location of the stations on a new line, there was no abstraction modelled from other stations

Comments on appropriateness of modelling:

Key Exogenous Modelling Assumptions (variables included, variable forecasts and elasticities)

The model drew heavily on PDFH recommendations for the bulk of the exogenous modelling assumptions (Appendix C, C3.3)

GDP growth and employment growth were both assumed to be higher than the recommended RIFF values. It was reasoned that the valley would experience greater than average growth given the relatively lower base (due to high unemployment and lower econmic activity in the area). An additional time trend of 3% p.a. was added to employment growth and 1% added to GDP growth to reflect these assumptions (Appendix C, Section C3)

Comments on appropriateness of modelling:

The modelling assumptions should have produced a higher than average growth rate. This does not tally with the low forecasts compared with actuals.

Demand Build-Up assumptions: Year 1 60% Year 2: 90% Year 3: 100% Year 4:

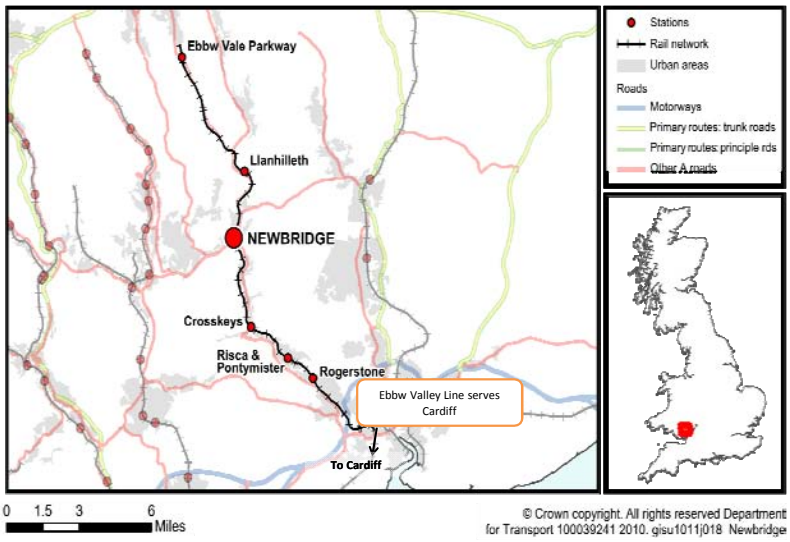
NEWBRIDGE (EBBW VALLEY LINE)

Opening Date 6th February 2008

Description of Station:

Newbridge railway station is on the Ebbw Valley Line and serves the towns of Newbridge and Blackwood in south east Wales. The single-platform station is on the site of the former station and coal yard in the town centre opposite the Somerfield food store and existing council car park.

Source: Wikipedia



Summary Information	**Govt Office Region**	Welsh Assembly Government	**Station Facility Owner**	Arriva Trains Wales

Contact Information:

Other Contact Details (County Council or Promoter): Peter Slater, Director of Environment and Development, Blaenau Gwent County Borough Council
01495 355701

Station Categorisation Other Residential
Part of a new line opening

Station Accessibility

Public Transport In February 2009 Caerphilly County Borough Council began construction of a footbridge to link the station with the Comprehensive School, Leisure Centre and the town centre. Linking to public transport services running through Newbridge

Car (incl Car Parking) Local authority operated car park - 76 spaces inc. 4 disabled spaces
Cycle parking for 6 bicycles

Demand forecasts (and other information) prepared by: Steer Davies Gleave
Contact Details: Steve Hunter
0113 389 6400

Demand forecast source documents:
Ebbw Vale RPP Formal Bid Volume 1.pdf
Ebbw Vale RPP Formal Bid Volume 2.pdf
Phase One Demand & Appraisal spreadsheets

Both held at:
\\Douglas\Work\Projects\Projects\222\2\73\01\External Inputs\Client\SDG\Ebbw Vale

18 .xls files stored at:
\\Douglas\Work\Projects\Projects\222\2\73\01\External Inputs\Client\SDG\Ebbw Vale\Phase One

Nominated Abstraction and Counterfactual Stations

Abstraction stations Hengoed, Ystrad Mynach, Pontypool & New Inn
Counterfactual stations None

NEWBRIDGE (EBBW VALLEY LINE) : REVIEW OF DEMAND FORECASTS AND METHODOLOGY

Train Service

Planned The business case was for the phased introduction of a 1tph Cardiff service (2005 original opening date) followed by a 1tph Newport service when Network Rail works to the station allowed it (2009 as stated in the Business Case documents).

Actual Infrastructure was planned to accommodate both phases but was trimmed back (without SDG involvement - info sourced from Steve Hunter) and what was built only allows a single train per hour. At present therefore, only the 1tph to Cardiff is running. Journey time is 43 minutes

Document title, page number and table number of forecast demand:

Business case documents inlcude only demand estimates for the whole Ebbw Valley line and assuming the addition of Phase 2 to Newport in 2009. The original demand modelling and appraisal spreadsheets were used to calculate figures on a station by station basis and for Phase 1 only.

Forecasts of Producer only or Producer AND Attractor Trips?
Producer and attractor trips are forecast
Observed demand shows that in 2008/9 23% of demand was accounted for by trips Attracted to Newbridge.

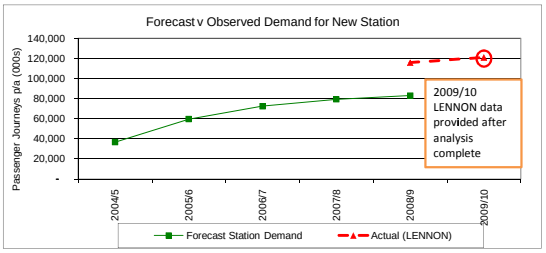
Method & assumptions used by SDG to convert demand forecast into same format (annual pax journeys) as LENNON station usage:

A suite of spreadsheets were supplied from which the appraisal demand figures were calculated. The original work calculated base journeys figures for each station using a logit models to estimate mode shift from car and bus with demand split into work/non work and peak/off peak segments (i.e. four in total). These station by station numbers were aggregated up to a smaller number of sectors (e.g. Valley North, Valley South, New Port, Cardiff etc..) and various growth factors applied at the sector level. To produce annual pax journeys on a station by station basis, the station by station numbers were taken from teh logit models and the relevant growth factors applied based on a lookup between stations and sectors from the original spreadsheets. The original demand ramp up assumptions were also applied to each station. These figures have been validated by checking the totals against the total for the whole Ebbw Valley line from the final appraisal spreadsheets.

Station Usage Data	2004/5	2005/6	2006/7	2007/8	2008/9	2009/10
Forecast Station Demand	36,623	59,587	72,397	79,220	82,951	
Actual (LENNON)					115,733	120,890
Actual (ORR)						

Is it known that some demand is excluded from LENNON/ORR? (eg Travelcard)

Comparison Commentary
Given the status of the station at the end of a new line, the do-minimum was zero. The original business case assumed an opening year of 2004/05. In reality, the line did not reopen until February 2008. In the first year of opening, patronage was 40% higher than the forecast for 2008/09 even taking into account the station being open for 5 years in the forecasts.



Modelling Technique Used

The modelling approach was split into three main elements -
i) a demand and revenue mode choice model
ii) a model that forecasts generated demand AND underlying rail growth
iii) an appraisal model

Two spreadsheet based logit models were used to calculate mode shift from car and bus to the new rail service. These models calculated mode choice probaibilities from generalised cost differences. The basedata for the logit models was locally collected from stated preference surveys carried out in October 2000. Over 1,000 interviews were carried out with regular travellers in the valley

The future year forecasting model estimated patronage and revenue for future years based on a number of demand/revenue drivers (detailed below). This model also included an estimate of 'generated demand' to allow for trips that were previously not made but had been made possible or more attractive by the new rail service. Generated demand was estimated by assuming that over the first 4 years of the project EITHER an additonal 17% or 30% demand was generated (depending on the OD pair). How these uplifts were arrived at is unclear.

The future year demand and evenue estimates were fed into the appraisal model which calculated the scheme's value for money across the 60 year appraisal period and took into account costs and wider scheme benefits]

Comments on appropriateness of modelling:

The basic approach to the modelling work is sound. The use of the trip rate model to estimate shift from car and bus (the two main competing modes) and growing these figures using a number of exogenous growth assumptions seems sensible. The assumptions used to calculate the level of shift from other modes and the amount of generated demand appear to be the key issues here

The lack of information on how generated trips were estimated is a cause for concern.

Key Endogenous Modelling Assumptions (trip rates, elasticities etc, state source where provided)
Trip rates: The base market for transfer from car was established using RSIs carried out for the study and supplemented by RSI data supplied by Gwent Consultancyfrom previous research for the M4 corridor. Movements where no rail alternative was possible were removed to create an 'in scope' car market. The base market for bus was calculated using ETM data for bus routes where rail would be an alternative (Appendix C, C1.3)

Logit model assumptions: The two logit models (car-to-rail and bus-to-rail choice models) were developed using local parameters derived from stated preference surveys carried out in Oct 2000. Over 1,000 interviews were carried out with regular travellers from the valley. The interviews were aimed at ascertaining their likelihood of changing mode based on changes in journey time, fare, and access/egress/wait times (Appendix C, C1.5)

Value of time and wait and access time wieghts were derived from the SP interviews. (VoT £2.07-£3.82 per hr for car, £0.31 to £0.60 for bus (Appendix C, Table C6)

Generalised time matrices for each OD pair were produced for each mode (car, bus, rail) and sub-mode (walk access, feeder bus accesss, car access to rail) using car and bus journey time information and data from the Trip rate modelling and SP surveys

The share of the overall car matrix forecast to transfer to rail was 3%, for bus the switch to rail was 11% (Appendix C, C2.37-2.39)

Comments on appropriateness of modelling:

The modelling methodology appears to be sound, however a 3% shift from car to rail (remembering that the car matrix was solely for those trips that hada a rail alternative) seems quite low.

The fact that it is not clear what the source is of the 17% or 30% uplift for generated trips is a cause for concern. A figure of 17% appears rather low, 30%+ would appear more realistic

Abstraction Modelled? (state abstracted stations, assumptions and abstraction forecasts)
Abstraction defined as a) stations within "catchment" and b) stations affected by additional calling point
Given the location of the stations on a new line, there was no abstraction modelled from other stations

Comments on appropriateness of modelling:

Key Exogenous Modelling Assumptions (variables included, variable forecasts and elasticities)

The model drew heavily on PDFH recommendations for the bulk of the exogenous modelling assumptions (Appendix C, C3.3)

GDP growth and employment growth were both assumed to be higher than the recommended RIFF values. It was reasoned that the valley would experience greater than average growth given the relatively lower base (due to high unemployment and lower econmic activity in the area). An additional time trend of 3% p.a. was added to employment growth and 1% added to GDP growth to reflect these assumptions (Appendix C, Section C3)

Comments on appropriateness of modelling:
The modelling assumptions should have produced a higher than average growth rate. This does not tally with the low forecasts compared with actuals.

Demand Build-Up assumptions: Year 1 60% Year 2: 90% Year 3: 100% Year 4:

RISCA AND PONTYMINSTER (EBBW VALLEY LINE)

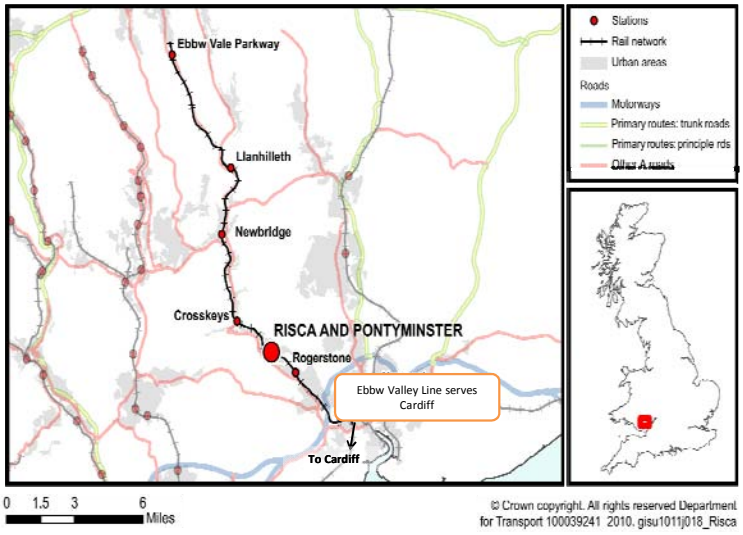
Opening Date **6th February 2008**

Description of Station:

Risca and Pontymister station is a station on the Ebbw Valley Line in south-east Wales. It serves the village of Pontymister and the town of Risca. It is located roughly ½ mile south of the original Risca railway station.

The station is located near Ty Isaf School and Mill Street. The site was originally railway sidings. The station has two platforms and a park and ride car park. Vehicular access to the station is off Maryland Road, with passenger access off Mill Street. The station opened on 6 February 2008 when services between Cardiff Central and Ebbw Vale Parkway railway station commenced. Future plans include an hourly service to Newport.

Source: Wikipedia



Summary Information **Govt Office Region** Welsh Assembly Government **Station Facility Owner** Arriva Trains Wales

Contact Information:

Other Contact Details (County Council or Promoter): Peter Slater, Director of Environment and Development, Blaenau Gwent County Borough Council
01495 355701

Station Categorisation Other Residential
Part of a new line opening

Station Accessibility

Public Transport

Car (incl Car Parking) Local authority operated car park - 94 spaces inc 6 disabled spaces

Demand forecasts (and other information) prepared by: Steer Davies Gleave
Contact Details: Steve Hunter
0113 389 6400

Demand forecast source documents:

Ebbw Vale RPP Formal Bid Volume 1.pdf Ebbw Vale RPP Formal Bid Volume 2.pdf	Both held at: \\Douglas\Work\Projects\Projects\222\2\73\01\External Inputs\Client\SDG\Ebbw Vale
Phase One Demand & Appraisal spreadsheets	18 .xls files stored at: \\Douglas\Work\Projects\Projects\222\2\73\01\External Inputs\Client\SDG\Ebbw Vale\Phase One

Nominated Abstraction and Counterfactual Stations

Abstraction stations	None: Risca & Pontyminster is on a new line and in a valley, with no reasonable roads to locations with existing stations
Counterfactual stations	See above

RISCA AND PONTYMINSTER (EBBW VALLEY LINE) : REVIEW OF DEMAND FORECASTS AND METHODOLOGY

Train Service

Planned The business case was for the phased introduction of a 1tph Cardiff service (2005 original opening date) followed by a 1tph Newport service when Network Rail works to the station allowed it (2009 as stated in the Business Case documents).

Actual Infrastructure was planned to accommodate both phases but was trimmed back (without SDG involvement - info sourced from Steve Hunter) and what was built only allows a single train per hour. At present therefore, only the 1tph to Cardiff is running. Journey time is 30 minutes

Document title, page number and table number of forecast demand:

Business case documents inlcude only demand estimates for the whole Ebbw Valley line and assuming the addition of Phase 2 to Newport in 2009. The original demand modelling and appraisal spreadsheets were used to calculate figures on a station by station basis and for Phase 1 only.

Forecasts of Producer only or Producer AND Attractor Trips?

Producer and attractor trips are forecast

Observed demand shows that in 2008/9 18% of demand was accounted for by trips Attracted to Risca.

Method & assumptions used by SDG to convert demand forecast into same format (annual pax journeys) as LENNON station usage:

A suite of spreadsheets were supplied from which the appraisal demand figures were calculated. The original work calculated base journeys figures for each station using a logit models to estimate mode shift from car and bus with demand split into work/non work and peak/off peak segments (i.e. four in total). These station by station numbers were aggregated up to a smaller number of sectors (e.g. Valley North, Valley South, New Port, Cardiff etc..) and various growth factors applied at the sector level. To produce annual pax journeys on a station by station basis, the station by station numbers were taken from teh logit models and the relevant growth factors applied based on a lookup between stations and sectors from the original spreadsheets. The original demand ramp up assumptions were also applied to each station. These figures have been validated by checking the totals against the total for the whole Ebbw Valley line from the final appraisal spreadsheets.

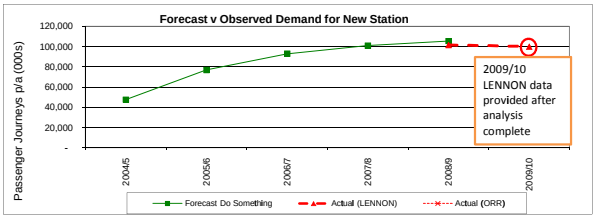
Station Usage Data

	2004/5	2005/6	2006/7	2007/8	2008/9	2009/10
Forecast Do Something	47,524	76,899	92,851	100,959	105,412	
Actual (LENNON)					101,624	99,977
Actual (ORR)						

Is it known that some demand is excluded from LENNON/ORR? (eg Travelcard)

Comparison Commentary

Given the status of the station at the end of a new line, the do-minimum was zero. The original business case assumed an opening year of 2004/05. In reality, the line did not reopen until February 2008. In the first year of opening, patronage was 4% lower than the forecast for 2008/09.



Modelling Technique Used

The modelling approach was split into three main elements -
i) a demand and revenue mode choice model
ii) a model that forecasts generated demand AND underlying rail growth
iii) an appraisal model

Two spreadsheet based logit models were used to calculate mode shift from car and bus to the new rail service. These models calculated mode choice probabilities from generalised cost differences. The basedata for the logit models was locally collected from stated preference surveys carried out in October 2000. Over 1,000 interviews were carried out with regular travellers in the valley

The future year forecasting model estimated patronage and revenue for future years based on a number of demand/revenue drivers (detailed below). This model also included an estimate of 'generated demand' to allow for trips that were previously not made but had been made possible or more attractive by the new rail service. Generated demand was estimated by assuming that over the first 4 years of the project EITHER an additonal 17% or 30% demand was generated (depending on the OD pair). How these uplifts were arrived at is unclear.

The future year demand and evenue estimates were fed into the appraisal model which calculated the scheme's value for money across the 60 year appraisal period and took into account costs and wider scheme benefits]

Comments on appropriateness of modelling:

The basic approach to the modelling work is sound. The use of the trip rate model to estimate shift from car and bus (the two main competing modes) and growing these figures using a number of exogenous growth assumptions seems sensible. The assumptions used to calculate the level of shift from other modes and the amount of generated demand appear to be the key issues here

The lack of information on how generated trips were estimated is a cause for concern.

Key Endogenous Modelling Assumptions (trip rates, elasticities etc, state source where provided)

Trip rates: The base market for transfer from car was established using RSIs carried out for the study and supplemented by RSI data supplied by Gwent Consultancyfrom previous research for the M4 corridor. Movements where no rail alternative was possible were removed to create an 'in scope' car market. The base market for bus was calculated using ETM data for bus routes where rail would be an alternative (Appendix C, C1.3)

Logit model assumptions: The two logit models (car-to-rail and bus-to-rail choice models) were developed using local parameters derived from stated preference surveys carried out in Oct 2000. Over 1,000 interviews were carried out with regular travellers from the valley. The interviews were aimed at ascertaining their likelihood of changing mode based on changes in journey time, fare, and access/egress/wait times (Appendix C, C1.5)

Value of time and wait and access time wieghts were derived from the SP interviews. (VoT £2.07-£3.82 per hr for car, £0.31 to £0.60 for bus (Appendix C, Table C6)

Generalised time matrices for each OD pair were produced for each mode (car, bus, rail) and sub-mode (walk access, feeder bus accesss, car access to rail) using car and bus journey time information and data from the Trip rate modelling and SP surveys

The share of the overall car matrix forecast to transfer to rail was 3%, for bus the switch to rail was 11% (Appendix C, C2.37-2.39)

Comments on appropriateness of modelling:

The modelling methodology appears to be sound, however a 3% shift from car to rail (remembering that the car matrix was solely for those trips that hada a rail alternative) seems quite low.

The fact that it is not clear what the source is of the 17% or 30% uplift for generated trips is a cause for concern. A figure of 17% appears rather low, 30%+ would appear more realistic

Abstraction Modelled? (state abstracted stations, assumptions and abstraction forecasts)
Abstraction defined as a) stations within "catchment" and b) stations affected by additional calling point

Given the location of the stations on a new line, there was no abstraction modelled from other stations

Comments on appropriateness of modelling:

Key Exogenous Modelling Assumptions (variables included, variable forecasts and elasticities)

The model drew heavily on PDFH recommendations for the bulk of the exogenous modelling assumptions (Appendix C, C3.3)

GDP growth and employment growth were both assumed to be higher than the recommended RIFF values. It was reasoned that the valley would experience greater than average growth given the relatively lower base (due to high unemployment and lower econmic activity in the area). An additional time trend of 3% p.a. was added to employment growth and 1% added to GDP growth to reflect these assumptions (Appendix C, Section C3)

Comments on appropriateness of modelling:

The modelling assumptions should have produced a higher than average growth rate. This does not tally with the low forecasts compared with actuals.

Demand Build-Up assumptions: Year 1 60% Year 2: 90% Year 3: 100% Year 4:

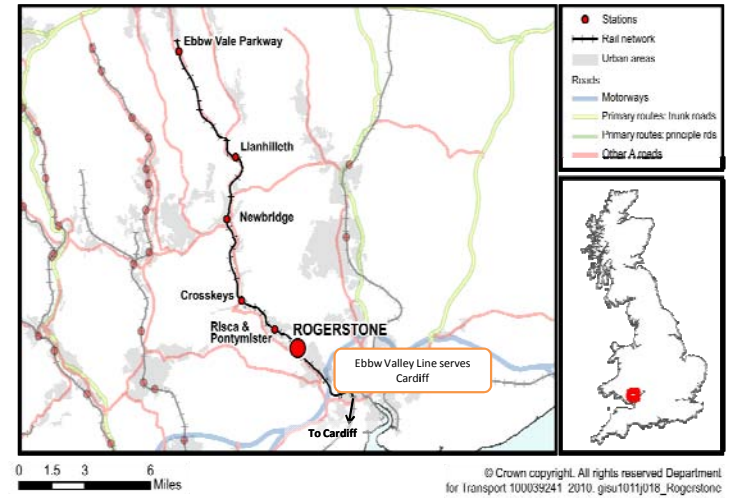
ROGERSTONE (EBBW VALLEY LINE)

Opening Date 6th February 2008

Description of Station:

Rogerstone station is on the Ebbw Valley Line in the community of Rogerstone in Newport, South Wales. The station is situated ½ mile north of the original station on the site of former rail sidings. The single platform station is within the Afon Village housing development. Access to the single-platform station and associated car park is off Lily Way.

Source: Wikipedia



Summary Information **Govt Office Region** Welsh Assembly Government **Station Facility Owner** Arriva Trains Wales

Contact Information:

Other Contact Details (County Council or Promoter): Peter Slater, Director of Environment and Development, Blaenau Gwent County Borough Council
01495 355701

Station Categorisation Other Residential
Part of a new line opening

Station Accessibility

Public Transport A subsidised rail linc bus operated between the station and Newport city centre via Celtic Springs, Cleppa Park, Tredegar Park and the Royal Gwent Hospital, from the reopening of the Ebbw Valley Line, but was withdrawn in May 2008 due to low usage.

Car (incl Car Parking) Local authority operated car park - 64 spaces inc 4 disabled spaces

Demand forecasts (and other information) prepared by: Steer Davies Gleave
Contact Details: Steve Hunter
0113 389 6400

Demand forecast source documents:
Ebbw Vale RPP Formal Bid Volume 1.pdf
Ebbw Vale RPP Formal Bid Volume 2.pdf
Phase One Demand & Appraisal spreadsheets

Both held at: \\Douglas\Work\Projects\Projects\222\2\73\01\External Inputs\Client\SDG\Ebbw Vale

18 .xls files stored at: \\Douglas\Work\Projects\Projects\222\2\73\01\External Inputs\Client\SDG\Ebbw Vale\Phase One

Nominated Abstraction and Counterfactual Stations

Abstraction stations None: Rogerstone is on a new line and in a valley, with no reasonable roads to locations with existing stations
Counterfactual stations See above

ROGERSTONE (EBBW VALLEY LINE) : REVIEW OF DEMAND FORECASTS AND METHODOLOGY

Train Service

Planned The business case was for the phased introduction of a 1tph Cardiff service (2005 original opening date) followed by a 1tph Newport service when Network Rail works to the station allowed it (2009 as stated in the Business Case documents).

Actual Infrastructure was planned to accommodate both phases but was trimmed back (without SDG involvement - info sourced from Steve Hunter) and what was built only allows a single train per hour. At present therefore, only the 1tph to Cardiff is running. Journey time is 26 minutes

Document title, page number and table number of forecast demand:

Business case documents include only demand estimates for the whole Ebbw Valley line and assuming the addition of Phase 2 to Newport in 2009. The original demand modelling and appraisal spreadsheets were used to calculate figures on a station by station basis and for Phase 1 only.

Forecasts of Producer only or Producer AND Attractor Trips?
Producer and attractor trips are forecast

Observed demand shows that in 2008/9 17% of demand was accounted for by trips Attracted to Rogerstone.

Method & assumptions used by SDG to convert demand forecast into same format (annual pax journeys) as LENNON station usage:

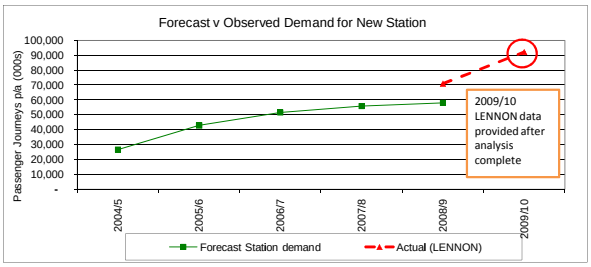
A suite of spreadsheets were supplied from which the appraisal demand figures were calculated. The original work calculated base journeys figures for each station using a logit models to estimate mode shift from car and bus with demand split into work/non work and peak/off peak segments (i.e. four in total). These station by station numbers were aggregated up to a smaller number of sectors (e.g. Valley North, Valley South, New Port, Cardiff etc..) and various growth factors applied at the sector level. To produce annual pax journeys on a station by station basis, the station by station numbers were taken from teh logit models and the relevant growth factors applied based on a lookup between stations and sectors from the original spreadsheets. The original demand ramp up assumptions were also applied to each station. These figures have been validated by checking the totals against the total for the whole Ebbw Valley line from the final appraisal spreadsheets.

Station Usage Data	2004/5	2005/6	2006/7	2007/8	2008/9	2009/10
Forecast Station demand	26,514	42,868	51,569	55,840	58,087	
Actual (LENNON)					71,041	92,286
Actual (ORR)						

Is it known that some demand is excluded from LENNON/ORR? (eg Travelcard)

Comparison Commentary

Given the status of the station at the end of a new line, the do-minimum was zero. The original business case assumed an opening year of 2004/05. In reality, the line did not reopen until February 2008. In the first year of opening, patronage was 22% higher than the forecast for 2008/09 despite a 5 year demand buld up assumed in the forecasts



Modelling Technique Used

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The future year demand and evenue estimates were fed into the appraisal model which calculated the scheme's value for money across the 60 year appraisal period and took into account costs and wider scheme benefits]

Comments on appropriateness of modelling:

The basic approach to the modelling work is sound. The use of the trip rate model to estimate shift from car and bus (the two main competing modes) and growing these figures using a number of exogenous growth assumptions seems sensible. The assumptions used to calculate the level of shift from other modes and the amount of generated demand appear to be the key issues here

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The modelling methodology appears to be sound, however a 3% shift from car to rail (remembering that the car matrix was solely for those trips that hada a rail alternative) seems quite low.

The fact that it is not clear what the source is of the 17% or 30% uplift for generated trips is a cause for concern. A figure of 17% appears rather low, 30%+ would appear more realistic

Abstraction Modelled? (state abstracted stations, assumptions and abstraction forecasts)
Abstraction defined as a) stations within "catchment" and b) stations affected by additional calling point
Given the location of the stations on a new line, there was no abstraction modelled from other stations

Comments on appropriateness of modelling:

Key Exogenous Modelling Assumptions (variables included, variable forecasts and elasticities)

The model drew heavily on PDFH recommendations for the bulk of the exogenous modelling assumptions (Appendix C, C3.3)

GDP growth and employment growth were both assumed to be higher than the recommended RIFF values. It was reasoned that the valley would experience greater than average growth given the relatively lower base (due to high unemployment and lower econmic activity in the area). An additional time trend of 3% p.a. was added to employment growth and 1% added to GDP growth to reflect these assumptions (Appendix C, Section C3)

Comments on appropriateness of modelling:
The modelling assumptions should have produced a higher than average growth rate. This does not tally with the low forecasts compared with actuals.

Demand Build-Up assumptions: Year 1 60% Year 2: 90% Year 3: 100% Year 4:

EDINBURGH PARK

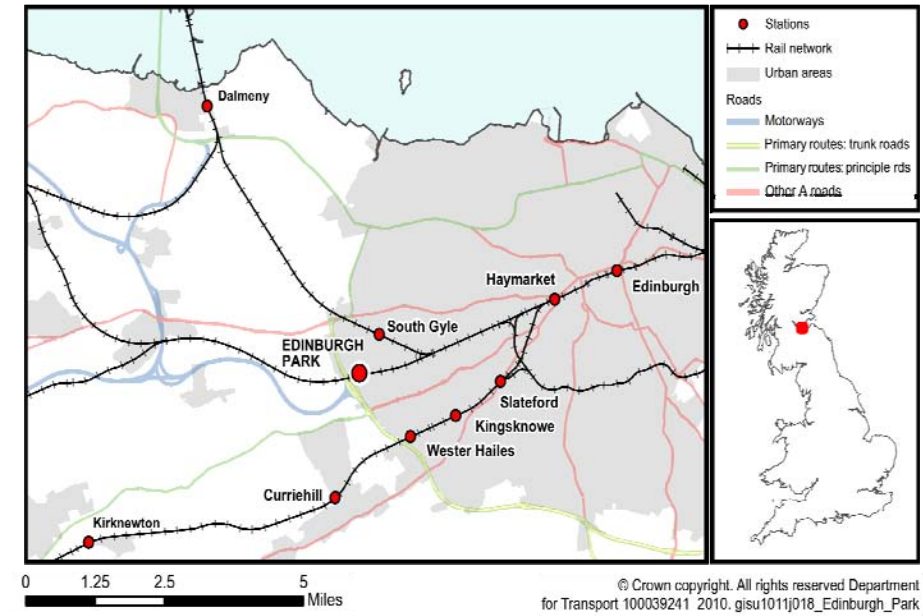
Opening Date **8th December 2003**

Description of Station:

Edinburgh Park station lies to the west of Edinburgh on the edge of South Gyle serving the Edinburgh Park business park and the Hermiston Gait shopping centre.

There are two platforms, linked by a covered footbridge, which is accessible by either stairs or a lift. There is also a pedestrian underpass just outside the station, accessible from both platforms.

Source: Wikipedia



Summary Information	**Govt Office Region**	Scotland	**Station Facility Owner**	First Scotrail

Contact Information:

Other Contact Details (County Council or Promoter): Edinburgh City Council & New Edinburgh Limited (developer)

Station Categorisation Destination station: Work/Leisure

Station Accessibility

Public Transport A free peak period shuttle bus service runs from the station to various destinations in a loop around the Edinburgh Park business park. Various local bus services also call at the station.

Car (incl Car Parking) No parking on site

Demand forecasts (and other information) prepared by: Halcrow

Contact Details: None supplied - original forecasts and associated information available via Jacobs' review of Halcrow's RPP Bid

Demand forecast source documents: Jacobs Review of RPP Bid Submission and Economic Appraisal for SRA, August 2002

Nominated Abstraction and Counterfactual Stations

Abstraction stations	South Gyle
Counterfactual stations	Edinburgh Waverley
	Haymarket

EDINBURGH PARK : REVIEW OF DEMAND FORECASTS AND METHODOLOGY

Train Service

Planned Roughly every 15 mins - stops included on existing services to Bathgate and Dunblane

Actual Roughly every 15 mins - 2tph to Bathgate, 2tph to Dunblane

Document title, page number and table number of forecast demand:
Jacobs Assessment spreadsheet: Edinburgh Park Assess4.xls!Applicant's View. Row 47

Forecasts of Producer only or Producer AND Attractor Trips?
The Jacobs reports states that the original forecasts: "acknowledges the absence of passenger car parking and that few people live in the 'walking' catchment area, so that rather than originating demand, the stations role will be to cater for journeys to/from the business park, principally destinating passengers commuting to work." (Jacobs, Review of RPP Bid Submission Report, p11). Therefore only Attractor trips were forecast.

Observed demand shows that in 2008/9 75% of demand was accounted for by trips Attracted to Edinburgh Park.

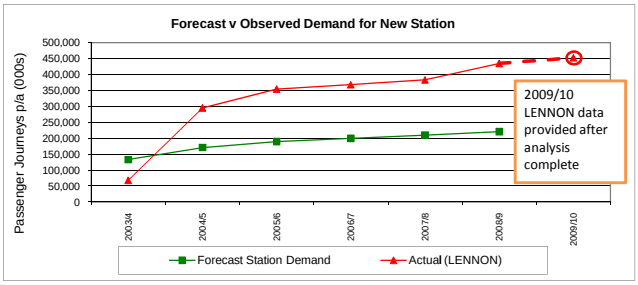
Method & assumptions used by SDG to convert demand forecast into same format (annual pax journeys) as LENNON station usage:

Taken directly from report.

Station Usage Data	2003/4	2004/5	2005/6	2006/7	2007/8	2008/9	2009/10
Forecast Station Demand	132,670	170,575	189,528	199,321	209,619	220,450	
Actual (LENNON)	68,050	295,157	354,109	367,659	382,823	434,442	451,834
Actual (ORR)							

Is it known that some demand is excluded from LENNON/ORR? (eg Travelcard) No

Comparison Commentary
It appears that the forecasts are around half the observed station usage. Whilst it appears that the "core" demand was underestimated in the forecasts, the growth rates of the forecast and actual are relatively similar (around 5%) once the build up period has tailed off (although there was a marked 13% rise in actual station usage last year).



Modelling Technique Used
Halcrow's forecasts were based on travel to work survey results, providing origin information, and a logit mode choice re-assignment model to estimate the shares of rail and road access to the business park. (p11 of Jacobs report), No further information on the modelling methodology and assumptions was provided in the Jacobs report however the Jacobs report states that Jacobs considered the approach taken to be appropriate from the information supplied and discussion with Halcrow.

Comments on appropriateness of modelling:

Key Endogenous Modelling Assumptions (trip rates, elasticities etc, state source where provided)
None of the trip rates assumed or modelling parameters from the logit mode choice model (used by Halcrow to forecast demand) were documented in the Jacobs review of the work.

Jacobs state that "Overall we consider the approach taken to be appropriate as far as we can ascertain from information supplied and discussion with the applicant's consultant" although no further detail is supplied.

Comments on appropriateness of modelling:

Due to lack of information it is not possible to comment on the methodology.

Abstraction Modelled? (state abstracted stations, assumptions and abstraction forecasts)
Abstraction defined as a) stations within "catchment" and b) stations affected by additional calling point
a) Abstraction from South Gyle station is estimated to be 22%.

b) Using MOIRA, Halcrow estimated a £108k loss in annual revenues due to the 2 minute journey time increase as a result of the additional stop at Edinburgh Park. This is not translated into demand in the report.

Comments on appropriateness of modelling:

Given the proximity of South Gyle station to Edinburgh Park (albeit on a different line out of Edinburgh), the 22% seems intuitvely reasonable. Abstraction would be from passengers travelling west out of Edinburgh to Edinburgh Park/Hermiston Gait

The £108k figure is deemed reasonable by Jacobs and SDG concur.

Key Exogenous Modelling Assumptions (variables included, variable forecasts and elasticities)
Growth in patronage appears to be linked (understandably) to forecast growth in employment at Edinburgh Park. Employment growth forecast equates to around 6.6% per annum (7,500 employees in 2002, 23,600 forecast in 2020). The patronage growth rate is 5.2%.

Comments on appropriateness of modelling:
It appears sensible that exogneous growth is tied strongly to growth in employment at Edinburgh Park given the characteristics of the station as a destination for employment.

Demand Build-Up assumptions: Year 1 70% Year 2: 90% Year 3: 100% Year 4:

EAST MIDLANDS PARKWAY

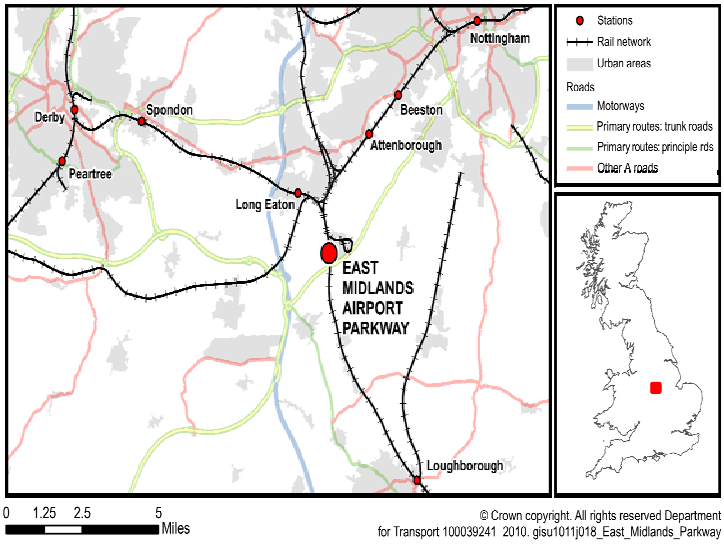
Opening Date **26th January 2009**

Description of Station:

East Midlands Parkway Station (EMPS) is owned by Network Rail and managed by East Midlands Trains (EMT). It is located north of Ratcliffe-on-Soar on the Midland Main Line. It provides park and ride facilities for rail passengers on the routes from Leicester to Derby and Nottingham, and also serves East Midlands Airport. East Midlands Parkway is a staffed, four-platform station with a ticket office.

The site of the station is in southwest Nottinghamshire, about 500 metres from the border with Leicestershire and 1 kilometre from that with Derbyshire, between the existing stations at Loughborough, Long Eaton and Attenborough. Shuttle buses provide a link to the airport. Road access is via the A453, which provides a link to the nearby (three minute drive) M1 motorway. There is a customer pick up / drop off area and a taxi rank adjacent to the station entrance.

Source: Wikipedia



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Summary Information **Govt Office Region** East Midlands **Station Facility Owner** Network Rail

Contact Information:

Other Contact Details (County Council or Promoter): Network Rail, Spencer Gibbens - Route Enhancement Manager (07767672564) (Source: Internet)

Station Categorisation Destination station: Airport
Park and Ride: Long distance inter-urban parkway

Station Accessibility

Public Transport Shuttle buses operating up to every thirty minutes between 0700 and 2330 provide a link to the airport from Ratcliffe on Soar, East Midlands Parkway station..

Car (incl Car Parking) The station comprises a 850-space car par and a cycle storage for 20 cycles.

Demand forecasts (and other information) prepared by: Steer Davies Gleave
Contact Details: 0207 910 5000

Demand forecast source documen 1) East Midlands franchise specification detailed business case - Final report v1.1 (November 2006)
Prepared by: Steven Bishop
2) Functional specification - East midlands parkway new stations draft v1.4 (January 2006)
Prepared by: Spencer Gibbens
3) East Midlands Parkway station business case methodology, assumptions and outputs - Powerpoint presentation (April 2006).

Note: These documents were prepared by SDG as part of their commission to support DfT in the Franchise Re-Negotiation

Nominated Abstraction and Counterfactual Stations

Abstraction stations Derby, Nottingham, Long Eaton, Loughborough, Beeston
Counterfactual stations Leicester

EAST MIDLANDS PARKWAY : REVIEW OF DEMAND FORECASTS AND METHODOLOGY

Train Service

Planned

It was anticipated that all passenger trains on the section of line will call at East Midland Parkway and planned provision of at least 5 trains per hour(tph) in each direction. Specifically, Nottingham/London 2tph, Sheffield/London 1tph, Derby/London 1 tph, Lincoln/Leicester 1tph.

Actual

Peak:
2tph Nottingham - St Pancras (xx00 and xx23)
1tph Sheffield - London (xx33)
2tph Leicester to Nottingham (xx07 and xx56)
1tph Nottingham - Leicester (xx45)
Implying 1tph fewer to London and a poor spread of departures over the hour.
It is also known that the actual journey time between EMP and London is longer than assumed in the forecasting

Off-Peak:
1tph Nottingham - London (xx38)
1tph Sheffield - London (xx31)
1tph Leicester - Lincoln (xx43)
Fewer trains to London than planned and with a longer journey time

Document title, page number and table number of forecast demand:

1) Demand Model v6.2 (R:\London\Projects\6600s\6684\Work\EMP Appraisal\Demand Model v6.2 base case.xls)

Forecasts of Producer only or Producer AND Attractor Trips?

Trips are based on Producer and Attractor demand. Generated Attractor Trips (Passengers terminating at EMPS). Calculated as a proportion (17%) of generated 'producer' trips from EMPS station, based upon assumption of 75% of proportion of 'attractor' trips at Derby, Nottingham and Loughborough. PAGE 151 BUSINESS CASE FINAL REPORT

Since the station only opened in late Jan 2009 there is no information on observed demand. However when it is available the forecasts should be compared with the sum of Producer AND Attractor demand.

Method & assumptions used by SDG to convert demand forecast into same format (annual pax journeys) as LENNON station usage:

The actual LENNON figure (of 33,891 journeys) is from April 2008 to March 2009: as the station was opened on the 26th of January the figure represents actual demand for 2 months. As such it is not appropriate to annualise it. The forecast is based on all 3 types of tickets (full price, reduced, season) and the demand build up for the first 3 years have been applied.

Station Usage Data	**2009**	**2009/2010**	**2011**
Forecast Station Demand	686,354	850,987	980,562
Actual (LENNON)		190,646	
Actual (ORR)			

Comparison Commentary

2009/10 LENNON data provided after analysis complete

Modelling Technique Used

The methodology adopted identified 3 elements of demand. 1) Abstraction - how many trips to given destinations are likely to be abstracted from other stations. 2) Generation - How many trips are likely to be newly generated. These elements are captured using a GIS based station catchment model, along with elasticity based generation function. The 3rd element of demand identified within the model is estimated rail demand to/from Nottingham East Midlands airport.

Catchment model - Abstraction has been estimated utilising a GIS based station catchment model, in conjunction with LENNON tickets sales data. The model predicts station catchments for each competitor station for a range of attractor stations through analysis of journey opportunities from given stations, station drive times and distribution of population within overall catchment area. The model estimates the catchment area and catchment populations of each the key competitor (to EMPS) stations before and after the introduction of EMPS and the catchment for EMPS itself. The outputs of the catchment model were combined with analysis of car availability of the EMPS catchment population, to derive a forecast of abstraction rates from each of the competitive stations.

Modal Transfer - Once the level of abstraction from each competitor station has been established, the model estimates generated demand using an elasticity function, which combines station-station generalised journey time(GJT) with weighted access times to establish the change in GJT including access time due to the introduction of EMPS. The following formula is then applied to calculate the demand uplift for for each portion of abstracted demand: L= 1+((Tnew-Tbase)/SSGTbase)g
L is the percentage future demand including the increase, T is the total generalised travel time including access time, SSGT is the station-to-station generalised time and g is an elasticity which can be varied according to the strength of competition from other modes.

Airport Passengers - It was assumed that there would be a good bus service (6/hour) connecting with all trains linking the airport and station and the new service will capture 2.5% of passengers and employees accessing the airport. Airport growth is assumed to be 6.5% per annum up to 2010, 5% per annum 2010-2020, and reducing by 0.5% per annum up to 2030 after which growth is assumed to be 0.5% per annum.

Comments on appropriateness of modelling:

Methodology appears sound

Key Endogenous Modelling Assumptions (trip rates, elasticities etc, state source where provided)

An elasticity of -0.9 and AML weight of 3.0 was applied to Generalised Journey Times(GJT) to arrive at GJT for punctuality and performance. The elasticity of revenue/passenger miles journeys is 0.5

Comments on appropriateness of modelling:

Abstraction Modelled? (state abstracted stations, assumptions and abstraction forecasts)
Abstraction defined as a) stations within "catchment" and b) stations affected by additional calling point

MOIRA forecasts impact of timetable changes on demand and also abstraction from local stations

Comments on appropriateness of modelling:

Key Exogenous Modelling Assumptions (variables included, variable forecasts and elasticities)

TEMPRO version 5 was used for projections of economic growth (GDP growth of 2% pa), employment (1.5% pa) and population by area. The population of central London is expected to grow by 1.3% per year, inner London by 0.7% per year and outer London by 0.5% per year. This presents opportunities for additional leisure and business travel from London.

Fares were expected to grow at 3.7% and journeys expected to increase by 2% per annum. Annual Earnings Index of 4.4%

Standard PDFH4.1 elasticities were used to project traffic growth arising from economic factors.

Comments on appropriateness of modelling:

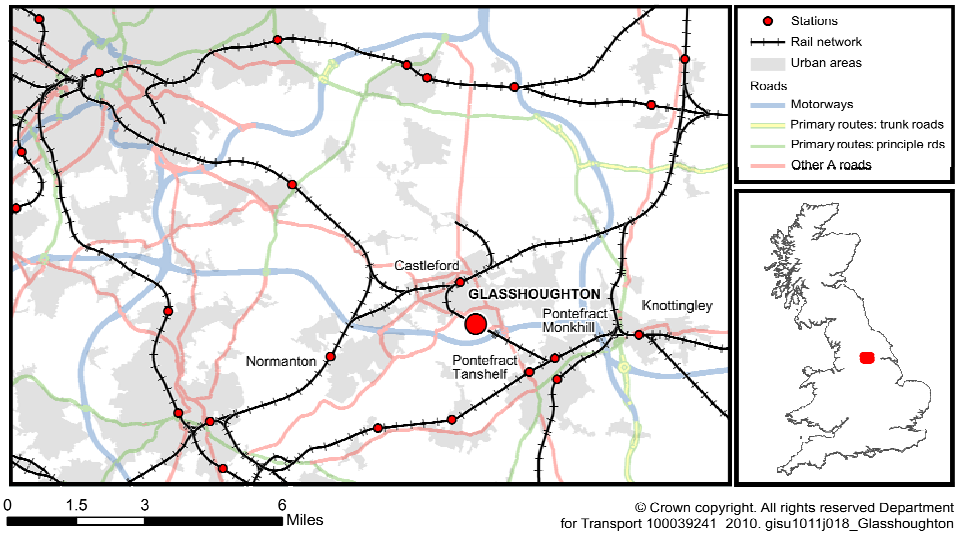
Demand Build-Up assumptions:	Year 1	Year 2:	Year 3:	Year 4:	Year 5+:
Abstraction	80%	90%	95%	100%	100%
Modal transfer	60%	80%	90%	100%	100%
Airport Growth	25%	50%	75%	100%	100%

GLASSHOUGHTON

Opening Date **12th December 2004**

Description of Station:
Glasshoughton is located on the rail route between Leeds and Knottingley in West Yorkshire, between the stations of Castleford and Pontefract Monkhill. The new station is on a former industrial estate, which has been redeveloped with housing, a retail outlet village (5 mins walk away) and Xscape indoor ski slope.

Source: Jacobs RPP bid review, WYPTE RPP Bid, Wikipedia



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Summary Information **Govt Office Region** Yorkshire & The Humber **Station Facility Owner** WYPTE

Contact Information:

Other Contact Details (County Council or Promoter): West Yorkshire Passenger Transport Executive (Metro) & Arriva Trains

Station Categorisation Other Residential

However: at the time of inception it was thought that there would be considerable "inward" use of the station (as a destination) and also use of the station as Park and Ride (access from M62). The forecasts assumed that there would be 1750 new jobs created from the shopping complex and leisure dome.

Station Accessibility

Public Transport No information supplied

Car (incl Car Parking) Car park with 100 spaces

Demand forecasts (and other information) prepared by: MVA (1999), reviewed by SDG (2001)
Contact Details: None available

Demand forecast source documents:
1) RPP Fast Track Bid: Glasshoughton Railway Station, WYPTE (Metro) and Arriva Trains Northern, July 2002
2) Glasshoughton Station RPP Bid (Review of), Jacobs, September 2002
3) Metro Rail and Infrastructure Plan, Metro, July 1999

Nominated Abstraction and Counterfactual Stations

Abstraction stations Pontefract Monkhill, Castleford
Counterfactual stations Normanton

GLASSHOUGHTON : REVIEW OF DEMAND FORECASTS AND METHODOLOGY

Train Service

Planned Glasshoughton station would be served by existing Arriva Trains Northern services on the route between Leeds and Goole via Knottingley. The train service was assumed to be hourly in each direction, with two arrivals in Leeds in the morning peak hour. The service was assumed to be operated by two-coach diesel multiple units

Actual There is an hourly service to Leeds and Knottingley Monday to Saturdays and on Sundays a two-hourly service in each direction.

Document title, page number and table number of forecast demand:

1) RPP Fast Track Bid: Glasshoughton Railway Station, WYPTE (Metro) and Arriva Trains Northern, July 2002: Table1.2 and accompanying RPP submission spreadsheet (see end of this FCT)

Forecasts of Producer only or Producer AND Attractor Trips?

The documentation specifically states that no forecasts were prepared for "inward trips". The forecasts have therefore been assumed to be "Producer" only.

Observed demand shows that in 2008/9 50% of demand was accounted for by trips Attracted to Glasshoughton, indicating that not forecasting Attractor trips was a major omission.

Method & assumptions used by SDG to convert demand forecast into same format (annual pax journeys) as LENNON station usage:

The RPP bid submission provided only Year 10 demand. However by finding the equivalent revenue forecast in the bid submission, and indexing all preceding years according to revenue growth over time, demand forecasts for each year could be inferred (see calcs below FCT)

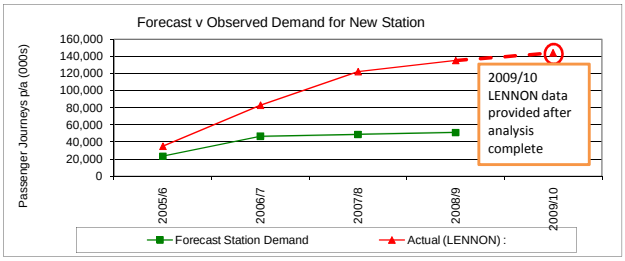
Whilst the station opened in Dec 2004, there were only 2000 journeys in the 2004/5 financial year (based on LENNON). It was deemed appropriate therefore to call 2005/6 Year 1.

Station Usage Data	**2005/6**	**2006/7**	**2007/8**	**2008/9**	**2009/10**
Forecast Station Demand	23,346	46,692	48,793	50,989	
Actual (LENNON) :	34,934	82,923	122,200	135,279	144156.1
Actual (ORR)					

Comparison Commentary

Actual demand has out-stripped forecast demand. Undoubtedly what contributed significantly to this was the exclusion of 3 sources of demand from the forecasts.

Interestingly, Jacob's forecasts, which appear to be based on trip rate analysis of nearby stations, have also been outstripped by demand: their forecast was 120 trips per day - equivalent to 43,000 per annum



Modelling Technique Used

A trip rate model was used to forecast trips from the existing housing and businesses in the area
The methodology (and therefore the demand forecasts) excluded 3 key sources of rail demand:
a) Inward journeys to Glasshoughton, b) Park and Ride journeys from M62 to Leeds and c) new residential development n the Glasshoughhton site
Models were produced for different time periods: am and pm peak (a combined 4 hour period) and the interpeak period (7 hours)

Comments on appropriateness of modelling:

It is not clear to what catchment of population (and employment?) data the trip rate model was applied. The exclusion of the three sources of demand woould be expected to result in demand being under-forecast

Key Endogenous Modelling Assumptions (trip rates, elasticities etc, state source where provided)

Peak trip rate model (which gave an r-squared of 0.764):
Number of adult boardings = exp 3.1032 + 0.6196 (employed people living in car owning househol;ds within 800m of the station) + 1.3308 (total frequency as tph) + 1.0883 (through services to Leeds 1=yes,0=no)

InterPeak trip rate model (which gave an r-squared of 0.51):
Number of adult boardings = exp 4.695 + 1.365 (total frequency as tph) + 0.362 (number of non-working residents over 16 in car owning households within 2km of the station)

Other assumptions:
Each boarding equates to a return trip
90% of journeys are new to rail, generating new rail revenue
85% of journeys are to Leeds and beyond, 15% are non-Leeds journeys
59% of new journeys are at peak times (source: rest of route)
Revenue per return journey = £1.73 (based on the cost of a daily return journey with a monthly Rail Zone 1-3 Metrocard.

Comments on appropriateness of modelling:

Abstraction Modelled? (state abstracted stations, assumptions and abstraction forecasts)
Abstraction defined as a) stations within "catchment" and b) stations affected by additional calling point

The train service will experience a time penalty of approximately two minutes as a result of the additional station stop. In the Leeds direction, this can be absorbed by existing pathing time at a junction, and does not use any performance allowance. In the Knottingley direction, there will be a journey time increase.
Implicitly (see above assumption about % of trips which are new to rail abstraction from nearby stations was taken account of.

Comments on appropriateness of modelling:
Whilst Jacobs acknowledged the increase in journey time, the original RPP bid makes no mention of it and associated abstraction was not forecast
A rather simple assumption was made about abstraction from nearby stations, possibly an underestimate

Key Exogenous Modelling Assumptions (variables included, variable forecasts and elasticities)

The documents contained no mention of exogenous growth, however by considering the RPP business case calculations it was possible to infer that the following exogenous growth had been assumed: First 7 years of operation: 4.5% growth pa, thereafter 2.5% pa

Comments on appropriateness of modelling:

Source of these growth forecast assumptions is unknown: it is possibly slightly over-optimistic to apply 4.5% to ALL demand in the first 7 years.

Demand Build-Up assumptions: Year 1 50% Year 2: 100% Year 3: Year 4:

No documentation describing build-up was provided, however from the business case calculations it was possible to infer these build-up assumptions

IMPERIAL WHARF

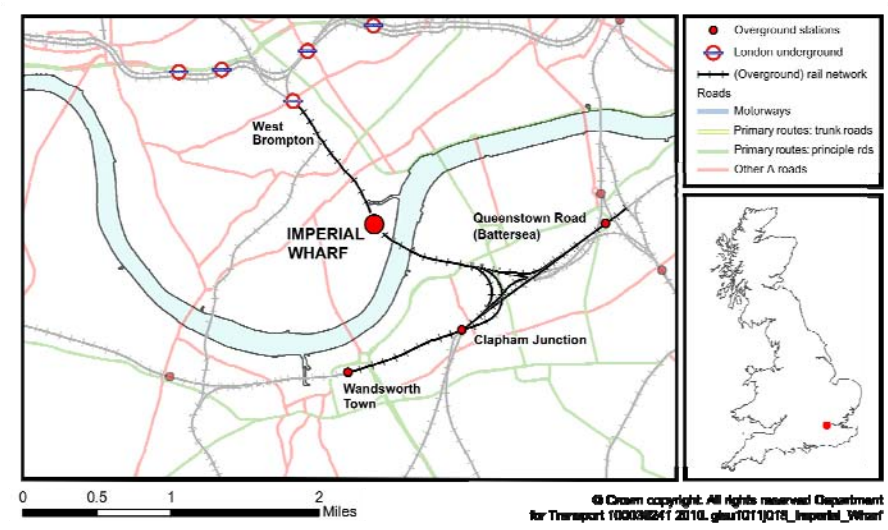
Opening Date **28th September 2009**

Description of Station:
Imperial Wharf is a railway station on the border of Chelsea and Fulham in west London on the West London Line. The station is between West Brompton and Clapham Junction stations and services are provided by London Overground and Southern trains.

The new station provides an important link for the Sands End area to Clapham Junction station in the south of London and northwards towards Willesden Junction station. This will be particularly important as the area is further developed by both private and public organisations.

The station takes its name from the adjacent redevelopment of a brownfield, former industrial, site, which has been developed into a luxury 1,800 apartment river-side complex by property developers St George over the last 5 years. As the Imperial Wharf development has continued to grow, so has the business case for the Imperial Wharf station. A further application for 1,500 residential units including a 37 storey tower was submitted to Hammersmith & Fulham Council in early 2009.

Source: Wikipedia



Summary Information **Govt Office Region** London **Station Facility Owner** London Overground

Contact Information:

Other Contact Details (County Council or Promoter): St George plc (Developer), Transport for London, London Borughs of Fulham and Hammersmith

Station Categorisation Residential : London & South East
Destination station: Work/Leisure

Station Accessibility Travel from the Imperial Wharf station to the new Westfield Shopping Centre at Shepherds Bush in only 9 minutes

Public Transport

Car (incl Car Parking)

Demand forecasts (and other information) prepared by: Faber Maunsell
Contact Details:

Demand forecast source documents: Business Case Narrative: Imperial Wharf New Station (23rd March 2007) : includes as Appendix 1: Faber Maunsell File Note: North London Railway, Imperial Wharf Business Case, dated 12th January 2007

Nominated Abstraction and Counterfactual Stations

Abstraction stations West Brompton
Counterfactual stations Kensington Olympia

IMPERIAL WHARF : REVIEW OF DEMAND FORECASTS AND METHODOLOGY

Train Service

Planned Gospel Oak - Barking 4tph, Stratford - Richmond 4tph, Stratford - Camden Road 2tph, Stratford - Clapham Jn 2tph
Willesden Jn - Clapham Jn 2tph, Watford Jn - Euston 3tph, West Croydon - Watford/Shepherds Bush 2tph
ELLX Phase 1
In summary, 6tph were assumed to serve Imperial Wharf.

Actual **At present the train service calling at Imperial Wharf comprises 5tph** of which: 2tph Clapham Jn - Stratford, 2tph Clapham Jn - Wilesden Jn and 1tph (soon to be increased to 2tph) East Croydon - Milton Keynes

Document title, page number and table number of forecast demand: Appx 1: Faber Maunsell File Note (Jan 2007), Tables 1 and 4

Forecasts of Producer only or Producer AND Attractor Trips?

Observed demand (passenger counts from TfL) only provides information on

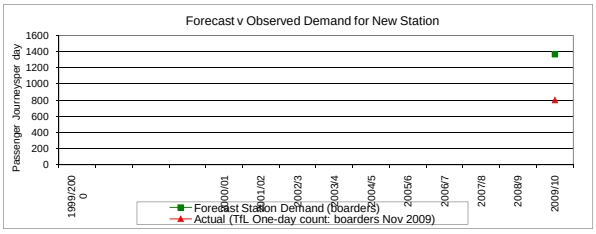
Method & assumptions used by SDG to convert demand forecast into same format (annual pax journeys) as LENNON station usage:
Table 1 in the appendix states that Railplan forecasts that in 2016 there will be 1073 (588+485) boarders and alighters at the station in the 3 hour am peak period. Table 4 shows that 462 (258+204) were forecast in 2001. No annual numbers of annualisation factors were provided.

SDG has taken the 2001 and 2016 demand forecasts from the report and assumed a uniform growth in the intervening years. Applying an annualisation factor and the build-up assumptions results in an estimated annual usage of 560,000 in 2010. Applying these growth and build-up assumptions implies 400 journeys to/from the station in the am peak in 2009. To convert this into a daily demand (to compare with TfL's weekday count) SDG have assumed 12 hours of service and that each hour carries equal demand, resulting in a daily forecast demand of 2486 passengers.

Station Usage Data	1999/2000	2000/01	2001/02	2002/3	2003/4	2004/5	2005/6	2006/7	2007/8	2008/9	2009/10
Forecast Station Demand (boarders)											1368
Actual (TfL One-day count: boarders Nov 2009)											800
Actual (ORR)											

Is it known that some demand is excluded from LENNON/ORR? (eg Travelcard) N/A: LENNON data not used for this station

Comparison Commentary



Modelling Technique Used

Forecasts were prepared using Railplan : TfL's strategic rail demand forecasting model. These forecasts were then compared with what the TRAVL database (a multi-modal trip generation database).

No information was provided on how the new station was modelled in Railplan in terms of connections from the station to the zones (in terms of population and employment), or bus services.
The documentation presents a comparison with forecast trips from the TRAVL database: which forecasts 2,126 walk and public transport trips in the morning peak period (no year specified). These forecasts are based on the trips rates assumed by TRAVL for each of the land use categories represented at Imperial Wharf.

Comments on appropriateness of modelling:
Using Raiplan to forecast demand for a new station is a very simplistic approach to forecasting the demand for a new station (unless that station is only a small element of a much larger strategic public transport scheme. TRAVL forecasts are also inappropriate, even for comparison purposes, as they are only available for journeys made by public transport or walk.

Key Endogenous Modelling Assumptions (trip rates, elasticities etc, state source where provided)
Detailed numbers of numbers of residential units, office, retail, financial and service floorspace etc were specified in the documentation.
The train service specification used to form the basis of the demand forecasts was specified (see above)

Comments on appropriateness of modelling:
Whilst the modelling note specified in detail the land use in the Imperial Wharf area, it is not clear whether this information was used in the modelling. Based on our understanding of the Raiplan model it is believed that it was not.

Abstraction Modelled? (state abstracted stations, assumptions and abstraction forecasts)
Abstraction defined as a) stations within "catchment" and b) stations affected by additional calling point
Implicitly some aspects of abstraction will have been modelled.

The extent to which abstraction from neighbouring stations will have been modelled depends on how the new Imperial Wharf station was coded in Railplan. In order to include a new station in Railplan it is necessary to connect the station to existing zones in the model. Implicitly therefore demand in these zones will have the choice between 2 or more stations (one of which will be Imperial Wharf).

IF journey times on services calling additionally at Imperial Wharf were coded (in the "with Imperial Wharf" scenario compared to the "Do Minimum") as having an increased journey time as a result of including the stop then the impact of uincreased journey times on existing passengers will have been included.

Comments on appropriateness of modelling:
The documentatation of the modelling does not confirm whether or not the journey times on the services calling at Imperial Wharf have been increased in the "with Imperioal Wharf" scenario. If they have not been increasedd then abstraction on line of route will not have been modelled.

Neither is it clear how the catchement area of Imperial Wharf was defined (in terms of the zones to which the station was attached). This will affect the modelling of abstraction from neighbouring stations

Key Exogenous Modelling Assumptions (variables included, variable forecasts and elasticities)
Forecasts were prepared for 2001 and 2016. The modelling documentation states that "the growth in demand between the 2001 and 2016 figures should reflect the development and the increase in expected trips".

Comments on appropriateness of modelling:
No information was provided on how the 2016 demand matrix for Railplan was prepared and what assumptions it is based on. It is not clear how the forecasts for the 2 forecast years were converted into forecasts for interim years.

It is assumed that the 2001 and 2016 forecasts were prepared using the 2001 Base Year Railplan demand matrix (the assignment of this demand to the network should have been the basis of a validated model for 2001). The 2016 future year Railplan demand matrix will have been prepared at a strategic level and will not accurately reflect the developments in the Imperial Wharf area.

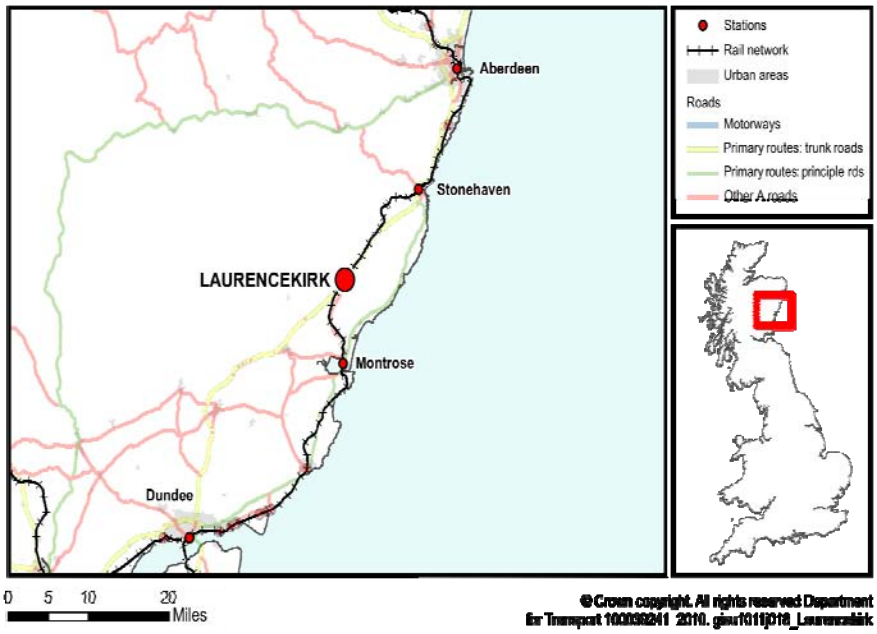
Demand Build-Up assumptions: Whilst the TfL document specifies that demand build-up was assumed to be 35% of the total in Year 1 (assumed by TfL to be 2008), 75% in Years 2 and 3 and 100% thereafter, it was not made clear how these assumptions were applied to the 2016 (or 2001) forecasts.

LAURENCEKIRK

Opening Date **18th May 2009**

Description of Station:
Laurencekirk station serves the communities of Laurencekirk and The Mearns on the East Coast Main Line between Dundee and Aberdeen. The original station closed in 1967

Source: Wikipedia/Scott Wilson report



Summary Information	**Govt Office Region**	Scotland	**Station Facility Owner**	First Scotrail

Contact Information:

Other Contact Details (County Council or Promoter): Aberdeenshire Council

Station Categorisation
Other Residential
Park and Ride

Station Accessibility

Public Transport Laurencekirk Interchange is less than 300m from the station. This provides onward bus connections to various destinations in the local area and beyond

Car (incl Car Parking) 74 space car park operated by local authority
4 uncovered cycle parking spaces

Demand forecasts (and other information) prepared by: Scott Wilson
Contact Details: Douglas Leeming
0141 3353149
Demand forecast source documents: Laurencekirk Station reopening STAG Part 2 Appraisal. Final Report, August 2004

Nominated Abstraction and Counterfactual Stations

Abstraction stations Montrose, Stonehaven
Counterfactual stations Portlethen, Arbroath

LAURENCEKIRK : REVIEW OF DEMAND FORECASTS AND METHODOLOGY

Train Service

Planned Approximately hourly in both directions - the timetable from the brief was consulted on with Scotrail and some minor adjustments made but this did not change the frequency of services.

Actual 10 trains per day in each direction - hourly in the AM and PM peaks and two hourly off peak.

Document title, page number and table number of forecast demand:
Para 6.2.7 in STAG2 report

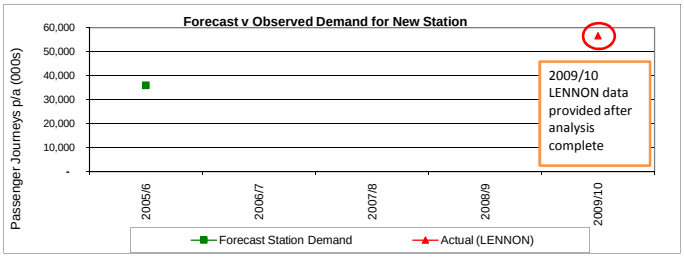
Method & assumptions used by SDG to convert demand forecast into same format (annual pax journeys) as LENNON station usage:

The Scott Wilson report contains no detail on the assumptions used to forecast the inital patronage estimate (based on a TEMPRO based trip rate model) into the future. Para 9.3.2 in the report appears to suggest that no background growth has been assumed as this is detailed as a further task.

Station Usage Data	2005/6	2006/7	2007/8	2008/9	2009/10
Forecast Station Demand	36,000				
Actual (LENNON)					56,647
Actual (ORR)					

Is it known that some demand is excluded from LENNON/ORR? (eg Travelcard) No

Comparison Commentary
Whilst the STAG2 assumed opening year to be 2006, the station actually opened in 2009 therefore no actual data is yet available for comparison



Modelling Technique Used
A trip rate model was used to estimate a single year annual patronage forecast. TEMPRO trip rates for Laurencekirk were extracted and modified for use in the specific area of the study (see detail in endogenous assumptions below) and car-rail transfer rates taken from previous MVA forecasts. It is unclear how this forecast was applied to future years (see exongenous assumptions below)

Comments on appropriateness of modelling:
The trip rate modelling approach appears sensible but the explanation of how the trip rate was derived is lacking. It is also unclear how (or even if) this single year forecast is grown over the appraisal period.

Key Endogenous Modelling Assumptions (trip rates, elasticities etc, state source where provided)

The average daily trip rate extracted from TEMPRO for Laurencekirk was 5.5 trips/day/household for 2001. Scott Wilson reduced this assumption down to 2.5 trips/day/household. The argument for this reduction is not entirely clear. The report states: "In some respects, the application of aggregate forecasts to a specific rural area may be open to question, given the impact of location and relative distance to prime facilities and services" (p25, para 6.2.5) but does not expand any further on why this should mean a halving of the TEMPRO trip rate other than to give a 'conservative' (p26, para 6.2.6) estimate. Para 6.2.5 also suggests that there is a high proportion of two car households - 30% and set to increase by another 10% in the next 20 years. Scott Wilson use previous MVA figures for the likely transfer from car to rail - 4% to Dundee and 2% to Aberdeen.

Comments on appropriateness of modelling:

The reasons for altering trip rates from the TEMPRO outputs are unclear. Given that car ownership is forecasts to increase, this would suggest a higher potential trip rate and lower propensity to transfer from car to rail. In the forecasts, the trip rate was halved and the transfer rates maintained at the levels set by MVA.

Abstraction Modelled? (state abstracted stations, assumptions and abstraction forecasts)
Abstraction defined as a) stations within "catchment" and b) stations affected by additional calling point
Abstraction is mentioned in the report at para 6.5.3. This details a method using MOIRA to estimate the reduction in patronage across the network due to the increased journey times to introduce a stop at Laurencekirk into the timetable on existing services. This is estimated at around 3,600 passengers per annum.

Comments on appropriateness of modelling:

The method for estimating the effect on exsting stations affected by the additional calling point is reasonable, however there is no mention of abstraction from stations within the Laurenckirk "catchment area".

Key Exogenous Modelling Assumptions (variables included, variable forecasts and elasticities)
The 30 year appraisal revenues quoted in para 6.2.7 (£5m) are simply the original 36,000 multiplied by an average fare (£7.20) and discounted over 30 years. There does not appear to be any background growth assumed. The STAG appraisal chapter only details total economic benefits (including journey time savings etc...) with no disaggregation of revenue.

Comments on appropriateness of modelling:
As above, it is unclear how (or if) background growth is included in the appraisal forecasts

Demand Build-Up assumptions:	Year 1	Year 2:	Year 3:	Year 4:
	Not detailed in report			

LIVERPOOL SOUTH PARKWAY

Opening Date **11th June 2006**

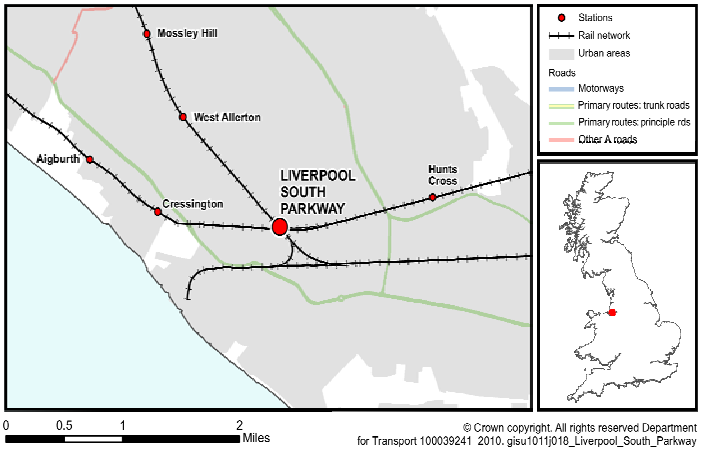
Description of Station:

Liverpool South Parkway station is a railway station and bus interchange in Garston, Liverpool.
The main line platforms at Liverpool South Parkway are on the site of the former Allerton station, which closed in 2005 to allow the required rebuilding work to take place. The Northern Line platforms are completely new, replacing a station at Garston which was slightly further west of the current station. The concourse, bus station and car park are built on land that was once the home of South Liverpool F.C

The station is located towards the southern end of Merseyrail's Northern Line and on the junction of two main lines: the City Line from Liverpool towards Manchester via Warrington and also towards London via Crewe on the Liverpool branch of the West Coast Main Line. The station was built to improve public transport access to Liverpool John Lennon Airport, and also to provide new journey opportunities for rail passengers in south Liverpool by allowing easy interchange between Northern Line, City Line and West Coast Main Line services.

It has a large park and ride facility as well as integrated transport links to Liverpool John Lennon Airport and the city centre. The new building has 6 platforms.

Source: Wikipedia



© Crown copyright. All rights reserved Department for Transport 100039241 2010. gisu1011j018_Liverpool_South_Parkway

Summary Information **Govt Office Region** North West **Station Facility Owner** Merseytravel

Contact Information:

Other Contact Details (County Council or Promoter): Merseytravel
0151 227 1581

Station Categorisation Park and Ride
Destination station: Airport

Station Accessibility

Public Transport There is a 5 stand bus station for local bus services. Bus services run from the station to Liverpool John Lennon Airport, Aigburth, Dingle, Mossley Hill and Liverpool City Centre. Services are operated by Arriva North West, Stagecoach Merseyside and Supertravel. Combined bus-rail tickets are available for rail passengers wishing to travel to the airport.

There is a 16 space taxi rank in addition to access to park and ride and public transport.

Car (incl Car Parking) The station comprises a 300-space car park for use as a Park and Ride facility and storage facilities for 65 bicycles.

Demand forecasts (and other information) prepared by: Steve Hunter, Steer Davies Gleave
Contact Details: 0113 389 6315

Demand forecast source documents:

1) Merseyside LTP Annual progress Report (July 2003) - Annex
Prepared by:Steer Davies Gleave
2) Rail Model Description and Outputs (July 2003)
Prepared by:Steer Davies Gleave
3) Outline financial inputs + £1 shuttle - MS Excel Spreadsheet
Prepared by:Steer Davies Gleave

4) Growth Assumptions - MS Excel Spreadsheet
(\\sdgworld.net\Data\Archive\Leeds\Projects\205300s\205342\Work\Appraisal\TUBA)
Prepared by:Steer Davies Gleave

Nominated Abstraction and Counterfactual Stations

Abstraction stations Hunts Cross, Cressington, West Allerton
Counterfactual stations Aigburth, Carshalton

LIVERPOOL SOUTH PARKWAY: REVIEW OF DEMAND FORECASTS AND METHODOLOGY

Train Service

Planned

1 train per hour to Manchester, Yorkshire or North East, Norwich and Birmingham. 2 trains per hour to Cardiff/Newport. This also provides 4 additional trains per hour from Allerton/Garston to Liverpool Lime street.

Actual

On the high-level platforms (1 and 2), Northern Rail provide two trains per hour in each direction on the City Line between Liverpool Lime Street and Manchester Oxford Road. On Sundays an hourly service operates.

2 trains per hour on First TransPennine Express service to Manchester, Leeds and the north east.

The East Midlands Trains service from Liverpool to Nottingham (with many services continuing to Norwich) serves the station hourly.

All London Midland services from Liverpool to Birmingham New Street call at Liverpool South Parkway. The service runs half-hourly Monday to Saturday, and hourly on Sundays. The option to continue to Cardiff is available at Birmingham.

On the Northern Line (Platforms 5 and 6), trains run every 15 minutes, Monday to Saturday, to Southport via Liverpool Central, with a half-hourly service on Sundays.

Document title, page number and table number of forecast demand:

1) Outline financial inputs + £1 shuttle - MS Excel Spreadsheet (\\sdgworld.net\Data\Archive\Leeds\Projects\205300s\205342\Work\Financial Model)

2) Growth Assumptions - MS Excel Spreadsheet (\\sdgworld.net\Data\Archive\Leeds\Projects\205300s\205342\Work\Appraisal\TUBA)

Forecasts of Producer only or Producer AND Attractor Trips?

The demand forecasts included forecasts of trips attracted to LSP in order to access Liverpool Airport. To be confirmed as to whether other demand attracted to LSP was forecast.

Observed demand shows that in 2008/9 23% of demand was accounted for by trips Attracted to Liverpool South Parkway

Method & assumptions used by SDG to convert demand forecast into same format (annual pax journeys) as LENNON station usage:

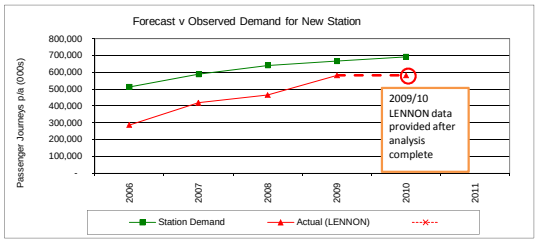
The total annual demand for 2001/2002 with/without Liverpool south parkway is available in the spreadsheet titled 'Outline financial inputs+£1'. The growth factors and demand build up mentioned below have been applied to arrive at the forecast figures.

Station Usage Data	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
Station Demand	513,292	588,059	640,652	666,238	692,199	
Actual (LENNON)	286,964	418,999	465,324	581,991	581,991	

Is it known that some demand is excluded from LENNON/ORR ? (eg Travel card) Yes MerseyRail Travel Card journeys will accont for a significant proportion of demand but they are excluded from the

Comparison Commentary

The actual demand has always been lower than expected. A posible reason could be because passengers who use Merseytravel cards are excluded in LENNON. The eventual service pattern delivered was nothing like what was expected at the time of the MSBC – certainly on opening although over time it has got closer to that envisaged. It is also understood that the airport link is not what was promised.



Modelling Technique Used

Three models were used: A standard PDFH rail demand elasticity model (based on changes in GJT) An airport accessibility model Logit model to forecast park and Ride

The **demand assessment was through elasticity based modelling of rail users** reactions to changes in journey times and costs through the construction of the station and provision of an enhanced train stopping pattern. Base data has been drawn from rail ticket information and a survey of users at Hunts Cross and Lime Street stations, the 2 current interchange locations for trips between the Northern line and regional rail networks.

Rail ticket sales data were extracted from MOIRA (Model of Intercity Rail Activity), CAPRI(Computer Analysis of Passenger Revenue Information) and Merseytravel ticket sales data for Garston origin trips. Data was zoned and a generalised journey time was prepared on the basis of average trip length, time, service frequency and need to interchange. These generalised journey times formed the "current" generalised journey times used in the subsequent modelling and were calculated from MOIRA outputs for Lime Street and Hunts Cross. Generalised journey times for Allerton and Garston, were calculated on the basis of the change in journey time from Lime Street and Hunts Cross. An asymmetric two way matrix format was used, with the zones set vertically according to the specification above, and horizontally split by their Liverpool Origin Destination.

New generalised journey times were calculated, assuming construction of Liverpool South Parkway and the envisaged train stopping pattern. These were compatred with the current generalised journey times and new demand calculated using an elasticity model.

The **airport accessibility model (AAM)** took the form of a standard Logit based mode share probability model with the country split into 21 zones. An 'existing' model for 2002 was constructed using parameters imported from recent AAMs and other local studies. A validation exercise adapted these parameters such that the model predicted the access mode proportions recorded by the November 2002 survey. Following successful validation 'do nothing' and 'do something' scenarios for the future were constructed and tested with the derived parameters.

The airport mode shift model calculates abstraction from existing bus and coach services directly, with other new passengers on rail coming from car and taxi. New passengers from the park and ride facilities all come from car.

Estimation of the transfer of **existing highway trips to Park and Ride** was carried out using a methodology, successfully applied by Steer Davies Gleave to a wide range of projects, including Merseytram. The standard form of the model compares generalised times for public transport and highway at the point of choice between the two modes. The model is effectively a logit based model based on standard generalised time formulations, including parking charges, but excluding trips which stay less than two hours in the city centre.

The model was constructed on the basis of 3 markets which would benefit or be attributed a greater cost of travel. People travelling from Allerton/Garston to Liverpool city centre, people travelling from the Northern line to rest of UK and people travelling through Liverpool south parkway. The model applied generalised time changes and using an elasticity function calculated the change in demand in response to them on these 3 broad groups.

For the rail demand model, increase in demand is calculated from an elasticity function. The additional passengers are assumed to come from abstraction from bus, car and generation of passengers who are currently not travelling or travelling to a different destination.
From the internal Merseyside zones it is assumed that 30% of the total generated traffic is abstracted from bus, 15% from North West zones and 5% from other zones.

Comments on appropriateness of modelling:

Airport accessibility model is dependent on spread parameters and the parkway model is also dependent on parameters (although the documentation indficates that the latter model has been validated based on previous examples

Key Endogenous Modelling Assumptions (trip rates, elasticities etc, state source where provided)

The base data inputs are from rail ticket information and a survey of users at Hunts cross and Lime street stations, the 2 current interchange locations for trips between the Northern line and regional rail networks.

Rail ticket sales data were extracted from MOIRA (Model of Intercity Rail Activity), CAPRI(Computer Analysis of Passenger Revenue Information) and Merseytravel ticket sales data for Garston origin trips. Data was zoned and a generalised journey time was prepared on the basis of average trip length, time, service frequency and need to interchange.

Comments on appropriateness of modelling:

Abstraction Modelled? (state abstracted stations, assumptions and abstraction forecasts)
Abstraction defined as a) stations within "catchment" and b) stations affected by additional calling point

Yes

Comments on appropriateness of modelling:

Key Exogenous Modelling Assumptions (variables included, variable forecasts and elasticities)

Rail passengers have been assumed to increase at the Merseyrail Electrics baseline predicted growth rate of approximately 3.5% until 2015. From 2015 until the last year of the appraisal, growth is assumed to continue at the predicted rate of GDP growth, 2.25%.
Airport passenger growth is expected to be 10.83% upto 2006, 0% in 2006, 2.38% from 2006-2010, 2.22% from 2010-2012, 2.1% from 2012-2015 and 0% thereon.
Park and Ride demand is assumed to grow at .4% upto 2006, .34% from 2006-2015 and .34% thereon.

Comments on appropriateness of modelling:

Growth rates appear sensible

Demand Build-Up assumptions:	Year 1	Year 2:	Year 3:	Year 4:	Year 5+:
Rail and Airport	70%	90%	100%	100%	100%
Park and Ride	60%	70%	80%	90%	100%

MITCHAM EASTFIELDS

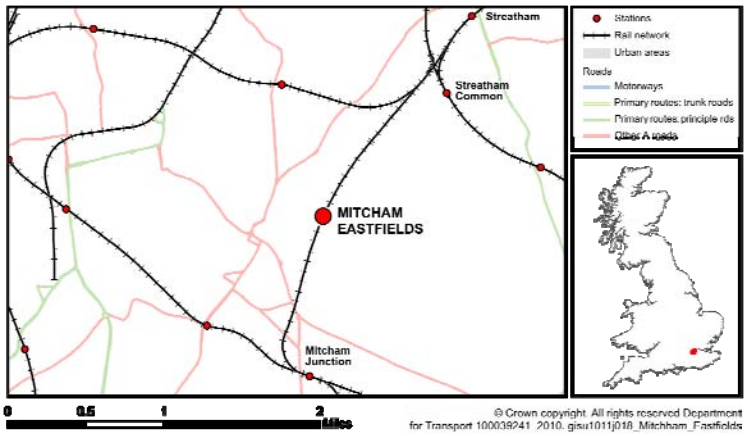
Opening Date **2nd June 2008**

Description of Station:

Mitcham Eastfields serves an area of South London previously poorly served by public transport. The station is only a 10 minute walk from Mitcham town centre, compared to the existing Mitcham Junction station which is over a mile away. Over 10,000 people live in the area. Previously the area was only served by bus along quite congested roads to Tooting Broadway and then the similarly congested Northern Line.

The station building is on the up (northbound) platform. The platforms are arranged so that each is situated beyond the Eastfield Road level crossing in the direction of travel, allowing the crossing to be reopened while trains are stopped at the station, minimising the disruption to road traffic. The station has step free access to both platforms. Interchange between platforms is via level crossing or lifts.

Source: Wikipedia



Summary Information **Govt Office Region** London **Station Facility Owner** Network Rail

Contact Information:

Other Contact Details (County Council or Promoter): London Borough of Merton

Station Categorisation Residential : London & South East

Station Accessibility

Public Transport A very high proportion of passengers arrive on foot. Buses 152 and 463 calls at the station every 20 minutes. The 152 operates between Pollards Hill and New Malden police station while the 463 operates between Pollards Hill and Coulsden. There is be no provision for parking at the station but a drop off facility for car passengers is available nearby in Grove Road. Facilities for storing cycles are provided at the station and the station is located close to part of the London Cycle Network (which passes across the Eastfields Road level crossing).

Car (incl Car Parking) No provision for parking. There is a sheltered cycle storage facility with a capacity of 20.

Demand forecasts (and other information) prepared by: Peter Brett Associates
Contact Details: 0173 287 1111

Demand forecast source documents:
1) Demand and Engineering Feasibility Study for Eastfields Station-Final Report (February 2000)
Prepared by:Peter Brett Associates
2) Eastfields New Station-Full Investment Appraisal Report (January 2008)
Prepared by:David Harley(Network Rail)
3) DCF SE Eastfields 0.7-MS Excel Spreadsheet (July 2007)
Prepared by:David Harley(Network Rail)

Nominated Abstraction and Counterfactual Stations

Abstraction stations Mitcham Jn, Streatham, Tooting
Counterfactual stations Hackbridge, Carshalton

MITCHAM EASTFIELDS : REVIEW OF DEMAND FORECASTS AND METHODOLOGY

Train Service

Planned

It was assumed that Southern and First Capital Connect (FCC) services call at the station frm May 2008. Services from/to Victoria or London Bridge are operated by Southern. Others are operated by FCC.

2tph will operate daily from Victoria/London Bridge with the first Soutbound train leaving Victoria at 0605 and the last one leaving Victoria at 2326. The expected journey time is 20 minutes. FCC services from Bedford, Luton and St Albans call at the staion at an approximate 2tph all day and continues to Sutton, Epsom, Dorking and Horsham. There are 59 Southbound services (Southern 33, FCC 26)

Northbound trains to Victoria/London Bridge from Mitcham Eastfields operates at 2tph with the first one leaving Mitcham eastfields at 0549 and the last train at 2308. The expected journey time is 18 minutes. FCC services from Horsham, Dorking, Epsom and Sutton calls at an approximate 2tph with one every half hour continuing to St Albans. There are 50 Northbound services (Southern 34, FCC 16)

The weekend service was assumed to be 2tph on Saturdays and 1tph on Sundays operated by Southern. The station would not be served by FCC trains at weekends.

Actual

4tph operate from/to Mitcham Eastfields to Victoria or London Bridge in the AM peak. The approximate journey time is 25 minutes.
Southern services: 2tph in each direction Epsom - London Victoria, with a journey time to Victoria of 18 minutes and a journey time to Epsom of 23 minutes.

First Capital Connect services: 2tph Sutton - St Albans via City Thameslink, journey time to City Thameslink is 23 minutes, journey time to Sutton is 12 minutes

On Saturdays and Sundays FCC services only serve local stations on the Wimbledon Loop.

Document title, page number and table number of forecast demand:

1) Demand and Engineering Feasibility Study for Eastfields Station-Final Report (AppendixA1)
2) Eastfields New Station-Full Investment Appraisal Report (Pages13,14)

Forecasts of Producer only or Producer AND Attractor Trips?

The rail trip rate model was based on population of each district and distance from the station (Document 1, Appendix A1). However the introduction states that Eastfields station is intended to improve access to jobs and other opportunities for local residents. It is concluded that the forecasts are only for "producer" trips.
Observed demand shows that in 2008/9 19% of demand was accounted for by trips Attracted to Mitcham Eastfields

Method & assumptions used by SDG to convert demand forecast into same format (annual pax journeys) as LENNON station usage:

The forecast for passengers generated in 1999 is 1792 weekday passengers (Document 1, page 19, table A1.5). The annualisation factor assumed for weekday flows is 252 days pa (Document 2, page 13). This results in expected annual passenger flow of 451,584 for 1999. This was asumed to grow by cumulative 10% by 2006 (Document 2, page 13), which will generate 496,742 passengers for 2006. There was assumed to be a 1.5%pa growth from 2006-2016 (Document 2, page 13) resulting in the forecast figures as found above (which are adjusted for the demand build up).

Comments on LENNON demand data

The actual data was for April 08 - March 09. But the service only started in June, so the actual demand only represents 10 months data. If this were factored up to a full year then it would be ((199,200/10) x 12)) = 239,040.

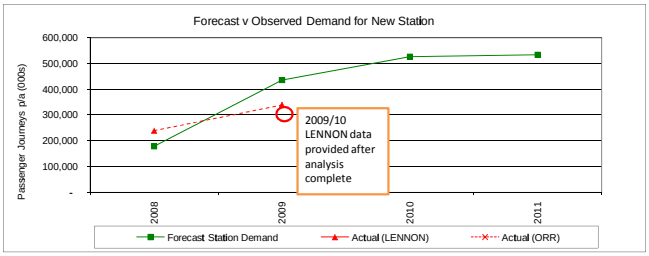
LENNON data for Mitcham Eastfields appears high given anecdotal comments about low demand at the station. However a check of LENNON indicates that they are correct.

Station Usage Data	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
Forecast Station Demand			179,115	436,323	527,224	535,132
Actual (LENNON)			239,040	339,422		
Actual (ORR)						

Is it known that some demand is excluded from LENNON/ORR ? (eg Travelcard) Yes, Travel card journeys

Comparison Commentary

It appears that Mitcham Eastfields has performed better than expected, with patronage in the first year 34% higher than forecast. However, the critical comparison will be forecast v actual demand for 2009/10, since the forecasts assumed a very steep build-up between the 1st and 2nd year of operation (35% in the first year, 84% in the 2nd).



Modelling Technique Used

A rail trip rate model was built to forecast the number of rail passengers who would use the new station. Daily flows from Tooting, Streatham Common and Mitcham Junction stations were used to arrive at the trip rate.
The 1991 census data provided information on the number of people resident in each enumeration district (ED). GIS was used to calculate the population density of each enumeration district by dividing the population of each ED by its area. This data shows that the proposed station at Eastfields is situated in a densely populated area of South London.

The London Research Centre supplied data collected by British Rail in 1991 and incorporated in the London Area Transportation Study (LATS) 1991 database of person trips in London. This data gave details of the trip made by people boarding a train at a railway station in the study area. The origin of each trip was plotted in order to allocate each trip origin to the ED in which the journey started.
A rail trip rate model was built by producing a scatterplot of trip density against the distance from the centroid of each enumeration district to the nearest station.

The catchment area of each station was defined as those enumeration districts where the centroid of the ED was nearest to that station. In order to validate the model, it was applied to several existing stations near Eastfields.

The variation in catchment area characteristics between stations caused the model to over-count passenger boardings for some stations and under-count for others. The model did not, however, produce large percentage differences from the observed numbers when tested, and was judged suitable for the purpose of estimating patronage at a new station in south London.

The model was then applied to Eastfields station. For each enumeration district within the catchment area of Eastfields station, the trip density was calculated using the model described above. By applying the 'with Eastfields station' trip density to the population within each ED the total number of rail trips from each ED was calculated. The total number of passenger boardings at Eastfields is the sum of the number of trips from each ED in the Eastfields catchment area.

Comments on appropriateness of modelling:

Seems reasonable approach.

Key Endogenous Modelling Assumptions (trip rates, elasticities etc, state source where provided)

For distances up to 1200 metres (from Eastfields station?) - Rail trip per 100 population = 46 - 5.96 ln(x)
(where x: distance from nearest station)
For distances over 1200 metres - Rail trips per 100 population = 1710 x-0.865
The rail trip rate used in this modelling exercise was derived from 1991 data. The forecast number of passenger boardings on a weekday at Eastfields are 1493 trips of which 753 (50%) are generations and 740 (50%) are abstractions.

Comments on appropriateness of modelling:

Quoted trip rates look strange is x in metres? Longer distance trip rate seems higher than shorter.

Abstraction Modelled? (state abstracted stations, assumptions and abstraction forecasts)

Abstraction defined as a) stations within "catchment" and b) stations affected by additional calling point

The level of abstracted trips was calculated by multiplying the rail trip density for each ED without Eastfields station by the population of the ED. These are the rail trips which would exist if the station was not there, but switch to Eastfields as it becomes their nearest station. The number of generated trips is obtained by taking away the number of abstracted trips from the total number of passengers boardings.

Comments on appropriateness of modelling:

Might expect even higher levels of abstraction. Not clear whether trip rates or abstraction include Tooting tube

Key Exogenous Modelling Assumptions (variables included, variable forecasts and elasticities)

Forecasts of growth in patronage over time assume that demand growth is due to the impact of a rise in the population in the area and an increase in the rail trip rate. A growth factor of 20% was applied to the demand forecasts produced by the trip rate model for the period between 1991 and 1999 which results in 1792 weekday passenger boardings at Eastfields station.

There is assumed to be a 10% cumulative growth from 1999 to 2006 based on Network Rail work for South London.
The growth for services from 2006-2016 is 1.5%pa: 0.75% to 2026 and 0% thereafter.

Comments on appropriateness of modelling:

Demand Build-Up assumptions:

Year 1 (Apr08-Mar09)	35%	Year 2 (Apr09-Mar10)	84%	Year 3 (Apr10-Mar11)	100%	Year 4 (Apr11-Mar12)	100%

Based on 50% build up after 6 months, 75% after 1 year and 100% after 2 years. Straight line for intermediate dates. The rationale for these build-up factors was not stated in the report. The build-up between Years 1 and 2 is especially steep.

SHEPHERDS BUSH

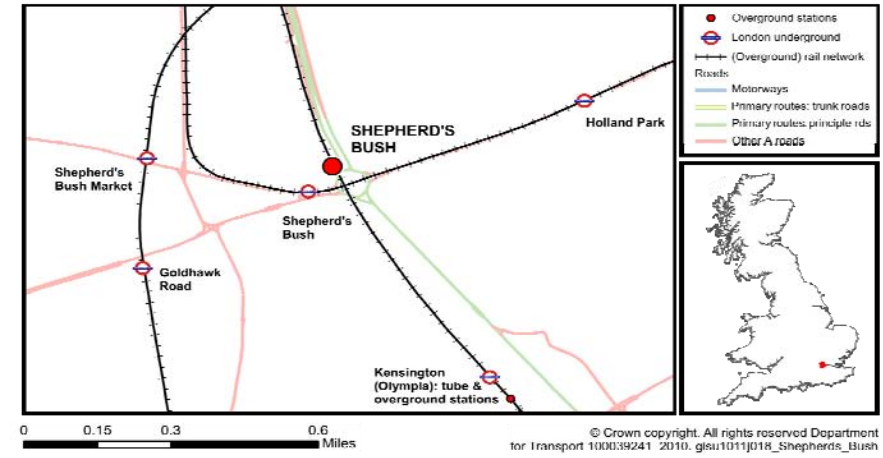
Opening Date **29th September 2008**

Description of Station:

Shepherd's Bush station is a railway station on the West London Line of the London Overground and Southern Rail network, opened on 28 September 2008. It provides an interchange with the nearby Shepherd's Bush Central line tube station.

The station has been built as part of the White City redevelopment and was designed and funded by the Westfield Group, the developers of the adjacent shopping complex. Construction of the station began in early 2006 and it was due to open in summer 2007. Although largely completed on time, the station was unable to open due to the northbound platform being 18 inches too narrow.

Source: Wikipedia



Summary Information **Govt Office Region** London **Station Facility Owner** London Overground

Contact Information:

Other Contact Details (County Council or Promoter): Westfield Group

Station Categorisation Residential : London & South East
Destination station: Work/Leisure

Station Accessibility

Public Transport

Car (incl Car Parking)

Demand forecasts (and other information) prepared by: Halcrow
Contact Details: David Alexander: 0206 602 7282

Demand forecast source documents: Technical Note: Project White City Development "Shepherds Bush WLL station demand forecasts" 26th June 2007 (Ref CTLAVE)

Nominated Abstraction and Counterfactual Stations

Abstraction stations Kensington Olympia
Counterfactual stations West Brompton

SHEPHERDS BUSH : REVIEW OF DEMAND FORECASTS AND METHODOLOGY

Train Service

Planned Not specified

Actual

Document title, page number and table number of forecast demand:
Technical Note: Project White City Development "Shepherds Bush

Method & assumptions used by SDG to convert demand forecast into same format (annual pax journeys) as LENNON station usage:
Table 4.1 of the report forecasts that 719 passengers will use the station in 2008 (opening year), 1288 in 2009 and 1508 in 2010. However it is not stated whether these are all day or am or pm peak. However, given the information in the document (which only states the trip rate for the pm peak) it is believed they are for the pm peak.

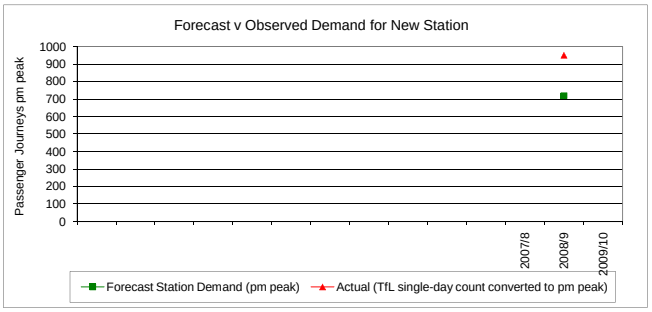
Method & assumptions used by SDG to convert actual demand into same format (annual pax journeys) as forecast station usage:

TfL have advised that a one-day count of passengers at Shepherds Bush in November 2009 showed 3500 passengers boarded trains. Based on an assumption that (given the nature of the market which the station serves) demand in each hour between 0900 - 2000 is the same, this equates to 950 passengers boarding trains in the pm (3-hour) peak.

Station Usage Data	2007/8	2008/9	2009/10
Forecast Station Demand (pm peak)		719	
Actual (TfL single-day count converted to pm peak)		950	
Actual (ORR)			

Is it known that some demand is excluded from LENNON/ORR? (eg Travelcard)

Comparison Commentary
The forecasts for the first year compare reasonably well with actual demand.



Modelling Technique Used
A trip rate approach was used based on actual demand at Kensington Olympia and the Shepherds Bush catchment area population and employment.
The catchment area for Kensington Olympia was defined by looking at the trips recorded in the 2001 LATS Rail surveys which accessed or egressed from this station.
It appears that this resulted in the catchment area thus defined was a 1km radius from the station.
The 2001 Census was then interogated to find the planning data for population (to drive station entries and employment (to drive station exits)] for Kensington Olympia and Shepherds Bush. This information was then scaled up to reflect each LTS forecast year (2006, 2011 etc)
The Shepherds Bush employment data was then adjusted to reflect the fact that the employment forecasts in LTS are at a strategic level (and thus the employment forecasts from the planning data for the catchment area would not adeuqtely reflect the new shopping centre(which accounts for 4000 jobs)
A survey of station entries and exits at Kensington Olympia was then undertaken on 13/9/07 and used to calculate trip rates for those accessing/egressing by walk only (where mode split was obtained from LATS): 92-94% of station use.
The trip rates for Kensington Olympia were then applied to the corrected population and employment data for Shepherds Bush and build-up assumptions applied
A fairly simple assumption was made to model abstraction: that one third of those in the overlap catchment area would shift to Shepherds Bush.
The Railplan model was then used to forecast Bus and LUL interchange at the station, and added into the forecasts as were those trips currently ing the bus service to the BBC

Comments on appropriateness of modelling:
The main assumption was that trips to/from Kensington Olympia reflects those of a mature market AND are a benchmark for what Shepherds Bush station will eventually become: not an unreasonable assumption.

Trip rate model approach appears sensible. However we believe that the additional employment near the Shepherds Bush site should have been ADDED NOT subtracted from the LTS planning data. This would result in a higher volume of trips at the station.

The trip rate approach seems sensible for commuters and reasonable for local employment (are employers local to both similar?), but aren't we missing all the shoppers? There must be a lot of abstraction from LUL as well. Again, can't we convert to an annual figure for comparison. 719 * 1200 (say) as less peaky = 860,000. 3,500 boarders per day = 3,500 x 2 (boarders and alighters) x 300 (ish) = 2.1m. Quite a difference, depends whether 3500 was actually just boarders. For comparison LENNON has a total of 250,000 for 6 months, and that won't include Travelcard. Tricky

Key Endogenous Modelling Assumptions (trip rates, elasticities etc, state source where provided)

Comments on appropriateness of modelling:

Abstraction Modelled? (state abstracted stations, assumptions and abstraction forecasts)
Abstraction defined as a) stations within "catchment" and b) stations affected by additional calling point
A fairly simple assumption was made to model abstraction: that one third of those in the overlap catchment area would shift to Shepherds Bush.

Comments on appropriateness of modelling:

A simple, but not unreasonable, assumption

Key Exogenous Modelling Assumptions (variables included, variable forecasts and elasticities)

Forecasts are provided at 5-yearly intervals, based on the years for which LTS forecasts employment and population.

Comments on appropriateness of modelling:

Appears reasonable IF the build-up factors are applied to take account of how the White City development will emerge in the early years.

Demand Build-Up assumptions: Year 1: 35% Year 2: 75% Year 3: 90% Year 4: 100%
Source: TfL's Business Case Development Manual

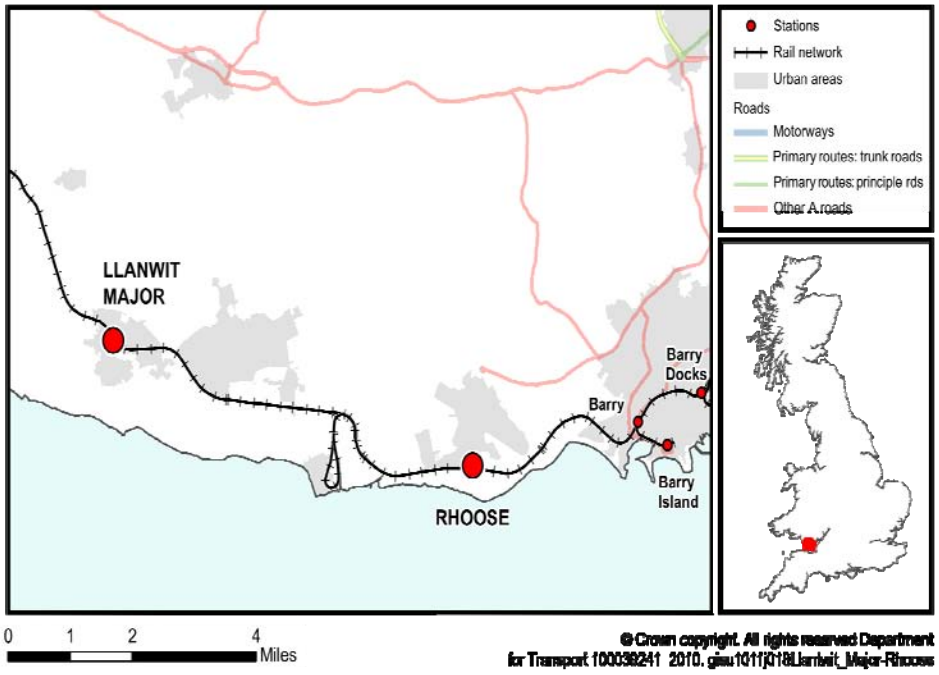
VALE OF GLAMORGAN: LLANTWIT MAJOR and RHOOSE CARDIFF INTERNATIONAL AIRPORT STATIONS

Opening Date 12th June 2005

Description of Station:
Llantwit Major station serves the small town of Llantwit Major in South Wales. It is located on the Vale of Glamorgan Line, 29 km (18¼ miles) west of Cardiff Central towards Bridgend via Barry and Rhoose.

Rhoose Cardiff International Airport railway station is a railway station that serves the village of Rhoose and Cardiff Airport. A dedicated shuttle bus connects this station with the airport terminal building. The station is located on the Vale of Glamorgan Line 19 km (11½ miles) west of Cardiff Central towards Bridgend via Barry and before Llantwit Major. Passenger services are operated by Arriva Trains Wales as part of the urban Valley Lines network, an urban rail network serving Cardiff and the surrounding area.

Source: Wikipedia



© Crown copyright. All rights reserved Department for Transport 100030241 2010. gisu1011j018Llantwit_Major-Rhoose

Summary Information	**Govt Office Region**	Welsh Assembly Government	**Station Facility Owner**	Arriva Trains Wales

Contact Information:

Other Contact Details (County Council or Promoter): Strategic Rail Authority

Station Categorisation		
	Llantwit Major	Other Residential Part of a new line opening
	Rhoose	Other Residential Destination station: Airport Part of a new line opening

Station Accessibility

Public Transport to Llantwit Major	Bus services operate to Cardiff (various buses c2bph) and approx 1bph to Cowbridge and Bridgend
Public Transport to Rhoose	A free shuttle bus operates every hour between the station and the airport for train ticket holders. There is also an hourly bus service to
Car (incl Car Parking) : Llantwit Major	There is cycle storage for 7 cycles and a car park with 40 spaces open 24 hours.
Car (incl Car Parking) : Rhoose	There is cycle storage and a 66 space car park

Demand forecasts (and other information) prepared by: MVA prepared the RPP bid, however the bid document was not provided to us for the study.
Contact Details:

Demand forecast source documents:
1) Vale of Glamorgan Line : Review of formal RPP bid submission (January 2001): Gibb (became Jacobs) (assumed that
2) Vale of Glamorgan, Supplementary Review issue No.1 (April 2002): Jacobs (considered the case if funding of
NB: the original RPP Bid document (including demand methodology) was not provided

Nominated Abstraction and Counterfactual Stations

	Rhoose	**Llantwit Major**
Abstraction stations	Barry	Barry
Counterfactual stations	Pencoed	Pencoed

VALE OF GLAMORGAN: LLANTWIT MAJOR and RHOOSE CARDIFF INTERNATIONAL AIRPORT STATIONS : REVIEW OF DEMAND FORECASTS AND METHODOLOGY

Train Service

Planned An hourly service is assumed from Monday to Saturday with a total of 18 trains per day operating in each direction. A 2 hourly Sunday service was later added in the bid submission with 8 trains in each direction. The proposal assumed service introduction in 2003.

Actual A direct train runs every hour from the station to Cardiff between Monday and Saturday. It operates in both directions and the approximate average journey time is 48 minutes. The same service operates on Sundays every 2 hours.

Document title, page number and table number of forecast demand:
1) Vale of Glamorgan Line : Review of formal RPP bid submission (January 2001) - Page 10

Forecasts of Producer only or Producer AND Attractor Trips?
The demand includes air passenger traffic at Rhoose. Very little information is available on the formeasting methodology and it is not clear whether other aspects of Attraction to the stations was modelled. It is assumed not.
Observed demand shows that in 2008/9 31% of demand was accounted for by trips Attracted to Rhoose and Llantwit Major

Method & assumptions used by SDG to convert demand forecast into same format (annual pax journeys) as LENNON station usage:

The demand available in the document was 328,000 journeys for both services (Llanwit Major and Rhoose Cardiff International Airport) in 2003. This was assuming service started in 2003. As the services actually began in 2005 it is assumed that this would be the demand for 2005 (starting year).

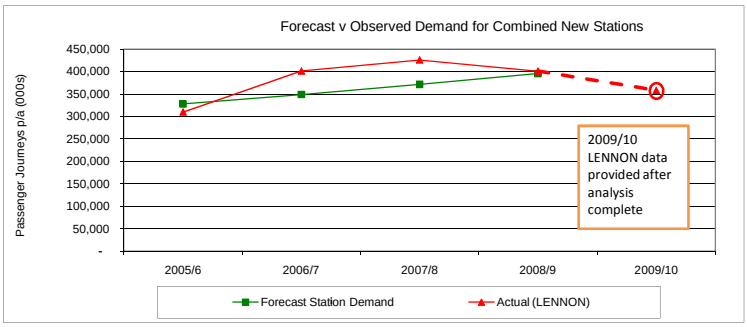
The growth per annum was assumed as the average between non air passenger traffic and air passenger traffic [(3.9%+9%)/2].

Station Usage Data	2005/6	2006/7	2007/8	2008/9	2009/10
Forecast Station Demand	328,000	349,156	371,677	395,650	
Actual (LENNON)	309,985	401,422	425,777	401,192	358724
Actual (ORR)					

Is it known that some demand is excluded from LENNON/ORR? (eg Travelcard)

Comparison Commentary

A constraint encountered was the lack of information on proportion split of the total demand and the split between non air passenger and air passenger traffic.



Modelling Technique Used
The methodology used by MVA to forecast demand was not provided (as the RPP bid document was not supplied). It could be inferred from the RPP Review document that MVA used a trip rate model, but this is far from certain

The modelling approach used in the RPP bid review (by Gibb) to estimate passenger demand for the 2 new Vale of Glamorgan (Rhoose Cardiff International airport and Llanwit Major) services was a trip rate model, together with MOIRA runs for the Barry-Cardiff market. The approach estimated 328,00 journeys (for both stations in total) for 2003.

The estimate for air feeder passenger demand for 2003 was a concern due to the proposed station at Rhoose being some distance from the airport necessitating interchange on to bus connections which resulted in the demand being scaled back by 12%. The potential mismatch between the time of day and day of week of air passengers trips and the train service was another concern, although this was addressed with the adding of Sunday services..

Comments on appropriateness of modelling:
Detailed information on the model specification was not available in the documents provided.

Key Endogenous Modelling Assumptions (trip rates, elasticities etc, state source where provided)

Comments on appropriateness of modelling:
Detailed information on endogenous modelling assumptions were not available in the documents provided.

Abstraction Modelled? (state abstracted stations, assumptions and abstraction forecasts)
Abstraction defined as a) stations within "catchment" and b) stations affected by additional calling point
No information on whether abstraction had been modelled.

Comments on appropriateness of modelling:
Detailed information on abstraction was not available in the documents provided.

Key Exogenous Modelling Assumptions (variables included, variable forecasts and elasticities)

Long term underlying growth rate for non-air passenger traffic was assumed at 2.5%pa. There was an overlay for the significant housing development at Rhoose and at Barry which resulted in an average total growth of 3.9% to 2013. From 2013 onwards growth was assumed at 2.25% pa.

The growth for air passenger rail feeder traffic for the first decade of operation was assumed at 9%pa. This was based on recent past demand growth at Cardiff airport and other work on regional airports. As there were no forecasts from 2013 onwards growth was assumed at 4.5%pa beyond 2013.

Comments on appropriateness of modelling:

Demand Build-Up assumptions:

Year 1		Year 2		Year 3		Year 4	
(2003)	50%	(2004)	75%	(2005)	100%	(2006)	100%

The proposal assumed service introduction in 2003 although the station was opened in July 2005.

WARWICK PARKWAY

Opening Date 8th October 2000

Description of Station:

Warwick Parkway railway station (owned by Chiltern Rail) serves the outer area of Warwick. The station is located a mile or so from junction 15 of the M40 motorway. The site was chosen for its proximity to main roads and the station was built to encourage passengers from car to rail travel and also to relieve pressure on the limited car parking space at Leamington Spa

Source: Wikipedia

Summary Information **Govt Office Region** West Midlands **Station Facility Owner** Chiltern Railways

Contact Information:

Other Contact Details (County Council or Promoter): Warwickshire County Council

Station Categorisation Park and Ride: Long distance inter-urban parkway

Station Accessibility

Public Transport

The station is also served by local buses from the nearby 'commuter' villages of Hampton Magna and Hampton-on-the-Hill; the buses also serve Warwick and Leamington Spa. National Express coaches run from the station to Heathrow and Gatwick airports

Car (incl Car Parking) 589 spaces run by Vinci Parking Ltd. The car park is open 24 hours and staffed Monday-Saturdays

Demand forecasts (and other information) prepared by: Steer Davies Gleave
Contact Details: Project managed by Andy Helm - now left the compay.

Demand forecast source documents:

1) Warwick Parkway Station: Supplementary Supporting Submission and Appendices A - D, Department of Planning, Transport and Ecomonc Strategy, Warwick, July 1998

2) SDG archived drive: The only demand data contained in the reports was daily patronage figures for a single year (2002/03). This was annualised using a flat 300 figure and grown by 2% per annum as assumed in the forecasting files in the same folder (\\Doulgas\Work\Projects\222\2\73\01\External Inputs\Client\SDG\Warwick Parkway\OPRAF.xls)

Nominated Abstraction and Counterfactual Stations

Abstraction stations	Warwick, Coventry, Claverdon, Lapworth, Hatton
Counterfactual stations	Leamington Spa (though could also be abstraction from here!)

WARWICK PARKWAY

Train Service

Planned

No details of service frequency in the documents reviewed

Actual

At least two trains an hour to London and Birmingham (source: Chiltern Railways website)

Document title, page number and table number of forecast demand:
Item 1) above, in which there is "Warwick Parkway 1999/2000 Submission : Supplementary Report v2.0, dated July 1998, page 3, table 2.1. Forecasts 670 daily passenger trips at the station for 2003
Item 2) above gave an annual growth rate of 2% per annum

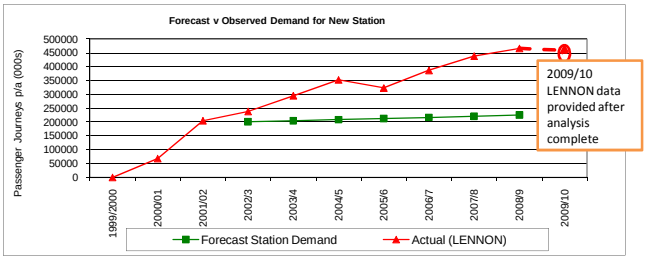
Method & assumptions used by SDG to convert demand forecast into same format (annual pax journeys) as LENNON station usage:

Annualised by an annualisation factor of 300, giving 201,000 annual trips and then the growth rate applied

Station Usage Data	1999/2000	2000/01	2001/02	2002/3	2003/4	2004/5	2005/6	2006/7	2007/8	2008/9	2009/10
Forecast Station Demand				201,000	204,819	208,711	212,676	216,717	220,835	225,030	
Actual (LENNON)	0	68,235	205,103	238,654	295,239	352,541	323,292	386,974	438,469	466,472	459,022
Actual (ORR)											

Is it known that some demand is excluded from LENNON/ORR? (eg Travelcard)

Comparison Commentary
It appears that the 2% growth rate used for the demand and revenue forecasts was very conservative. The CAGR 2002-2009 was 12%



Modelling Technique Used

Parkway Access Model: compares the relative accessibility of the Parkway statuib with that of the existing stations that serve the locality (Warwick and Leamington Spa, and for some journeys, Coventry). The model uses information in the catchement area of the existing stations, inclusing the origin postcode access mode and journey purpose), destination station and fare paid and the costs of getting to the origin station (incl parking costs and time)

Mode/Route Choice Model

Comments on appropriateness of modelling:

Key Endogenous Modelling Assumptions (trip rates, elasticities etc, state source where provided)
No specific details in the report

Comments on appropriateness of modelling:

Not enough detail to comment

Abstraction Modelled? (state abstracted stations, assumptions and abstraction forecasts)
Abstraction defined as a) stations within "catchment" and b) stations affected by additional calling point
Abstraction from Warwick and Leamington Spa stations was modelled. The daily figures assumed that 60% of the total patronage at Warwick Parkway would be abstracted from these stations

Comments on appropriateness of modelling:
Abstraction of 60% looks reasonable, arguably it's higher if you also include West Coast stations such as Coverntry.

Key Exogenous Modelling Assumptions (variables included, variable forecasts and elasticities)
The total growth rate used was 2% per annum.

Comments on appropriateness of modelling:
There was little detail on the source of this growth rate. The growth rate assumption looks low, but at the time when the business case was developed was probably considered to be a reasonable assumption.

Demand Build-Up assumptions: Year 1 Year 2: Year 3: Year 4:
No build up assumptions detailed

APPENDIX

B

PRODUCER ATTRACTOR ANALYSIS FOR SELECTED STATIONS

Appendix B

List of Stations

No.	Category	TLC Code	New Station
1	1	CFR	Chandlers Ford
2	1	DFE	Dunfermline Queen Margaret
3	1	GLH	Glasshoughton
4	1	KVD	Kelvindale
5	1	MTC	Mitcham Eastfields
6	2	CEH	Coleshill Parkway
7	2	WRP	Warwick Parkway
8	3	EDP	Edinburgh Park
9	6	BTP	Braintree Freeport
10	7	BSU	Brunstane
11	7	RCA	Risca and Pontyminster
12	8	ALO	Alloa
13	9	LRH	Larkhall
14	9	MEY	Merryton
15	10	RIA	Rhoose - CIP
16	11	EMD	East Midlands Airport Parkway
17	11	LSP	Liverpool South Parkway
18	12	EBV	Ebbw Vale Parkway

Chandlers Ford

Producer Journeys

Rank	Destination Code	Destination	Total	%
	Top Destination			
1	SOU	Southampton Cent	71,950	44.44%
	Top 3 Destinations			
1	SOU	Southampton Cent	71,950	44.44%
2	ESL	Eastleigh	22,313	13.78%
3	ROM	Romsey	9,128	5.64%
				63.85%
	Top 5			
1	SOU	Southampton Cent	71,950	44.44%
2	ESL	Eastleigh	22,313	13.78%
3	ROM	Romsey	9,128	5.64%
4	XZA	London Travelcard	7,962	4.92%
5	XLD	London BR	6,773	4.18%
				72.96%
	Top 10 Destinations			
1	SOU	Southampton Cent	71,950	44.44%
2	ESL	Eastleigh	22,313	13.78%
3	ROM	Romsey	9,128	5.64%
4	XZA	London Travelcard	7,962	4.92%
5	XLD	London BR	6,773	4.18%
6	WIN	Winchester	5,220	3.22%
7	PMS	Portsmouth & S	3,205	1.98%
8	SOA	Southampton Airp	2,935	1.81%
9	SAL	Salisbury	2,765	1.71%
10	BSK	Basingstoke	2,686	1.66%
				83.34%
	Top 20 Destinations			
1	SOU	Southampton Cent	71,950	44.44%
2	ESL	Eastleigh	22,313	13.78%
3	ROM	Romsey	9,128	5.64%
4	XZA	London Travelcard	7,962	4.92%
5	XLD	London BR	6,773	4.18%
6	WIN	Winchester	5,220	3.22%
7	PMS	Portsmouth & S	3,205	1.98%
8	SOA	Southampton Airp	2,935	1.81%
9	SAL	Salisbury	2,765	1.71%
10	BSK	Basingstoke	2,686	1.66%
11	SDN	St Denys	2,437	1.51%
12	RDB	Redbridge Hants	2,267	1.40%
13	BMH	Bournemouth	2,124	1.31%
14	BCU	Brockenhurst	1,872	1.16%
15	FRM	Fareham	1,776	1.10%
16	RDG	Reading	1,627	1.00%
17	CSA	Cosham	1,278	0.79%
18	MBK	Millbrook Hants	1,104	0.68%
19	BTH	Bath Spa	817	0.50%
20	HDE	Hedge End	756	0.47%
				93.26%

Attractor Journeys

Rank	Origin Code	Origin Station	Total	%
	Top Origin			
1	SOU	Southampton Cent	22,710	30.57%
	Top 3 Origins			
1	SOU	Southampton Cent	22,710	30.57%
2	ESL	Eastleigh	15,547	20.93%
3	SDN	St Denys	6,128	8.25%
				59.74%
	Top 5 Origins			
1	SOU	Southampton Cent	22,710	30.57%
2	ESL	Eastleigh	15,547	20.93%
3	SDN	St Denys	6,128	8.25%
4	ROM	Romsey	5,095	6.86%
5	FRM	Fareham	1,706	2.30%
				68.89%
	Top 10 Origins			
1	SOU	Southampton Cent	22,710	30.57%
2	ESL	Eastleigh	15,547	20.93%
3	SDN	St Denys	6,128	8.25%
4	ROM	Romsey	5,095	6.86%
5	FRM	Fareham	1,706	2.30%
6	SOA	Southampton Airp	1,569	2.11%
7	WIN	Winchester	1,553	2.09%
8	SWG	Swaythling	1,510	2.03%
9	HDE	Hedge End	1,478	1.99%
10	XLD	London BR	1,403	1.89%
				79.01%
	Top 20 Origins			
1	SOU	Southampton Cent	22,710	30.57%
2	ESL	Eastleigh	15,547	20.93%
3	SDN	St Denys	6,128	8.25%
4	ROM	Romsey	5,095	6.86%
5	FRM	Fareham	1,706	2.30%
6	SOA	Southampton Airp	1,569	2.11%
7	WIN	Winchester	1,553	2.09%
8	SWG	Swaythling	1,510	2.03%
9	HDE	Hedge End	1,478	1.99%
10	XLD	London BR	1,403	1.89%
11	SAL	Salisbury	1,305	1.76%
12	WLS	Woolston	1,025	1.38%
13	BTE	Bitterne	866	1.17%
14	RDB	Redbridge Hants	793	1.07%
15	MBK	Millbrook Hants	693	0.93%
16	NTL	Netley	687	0.92%
17	SHO	Sholing	676	0.91%
18	FTN	Fratton	605	0.81%
19	RDG	Reading	538	0.72%
20	SUR	Surbiton	504	0.68%
				89.36%

Dunfermline Queen Margaret

Producer Journeys

Rank	Destination Code	Destination	Total	%
	Top Destination			
1	EDB	Edinburgh	102,605	73.86%
	Top 3 Destinations			
1	EDB	Edinburgh	102,605	73.86%
2	SGL	South Gyle	16,394	11.80%
3	HYM	Haymarket	6,310	4.54%
				90.21%
	Top 5			
1	EDB	Edinburgh	102,605	73.86%
2	SGL	South Gyle	16,394	11.80%
3	HYM	Haymarket	6,310	4.54%
4	DAM	Dalmeny	1,923	1.38%
5	COW	Cowdenbeath	1,426	1.03%
				92.62%
	Top 10 Destinations			
1	EDB	Edinburgh	102,605	73.86%
2	SGL	South Gyle	16,394	11.80%
3	HYM	Haymarket	6,310	4.54%
4	DAM	Dalmeny	1,923	1.38%
5	COW	Cowdenbeath	1,426	1.03%
6	INK	Inverkeithing	1,349	0.97%
7	KDY	Kirkcaldy	1,307	0.94%
8	XGG	Glasgow BR	953	0.69%
9	DFL	Dunfermline	820	0.59%
10	LCG	Lochgelly	736	0.53%
				96.33%
	Top 20 Destinations			
1	EDB	Edinburgh	102,605	73.86%
2	SGL	South Gyle	16,394	11.80%
3	HYM	Haymarket	6,310	4.54%
4	DAM	Dalmeny	1,923	1.38%
5	COW	Cowdenbeath	1,426	1.03%
6	INK	Inverkeithing	1,349	0.97%
7	KDY	Kirkcaldy	1,307	0.94%
8	XGG	Glasgow BR	953	0.69%
9	DFL	Dunfermline	820	0.59%
10	LCG	Lochgelly	736	0.53%
11	CDD	Cardenden	643	0.46%
12	NQU	North Queensfy	510	0.37%
13	ROS	Rosyth	413	0.30%
14	GLT	Glnrthes Thornt	404	0.29%
15	XLD	London BR	264	0.19%
16	BTS	Burntisland	248	0.18%
17	DEE	Dundee	223	0.16%
18	MUB	Musselburgh	157	0.11%
19	AUR	Aberdour	126	0.09%
20	NCL	Newcastle	119	0.09%
				98.57%

Attractor Journeys

Rank	Origin Code	Origin Station	Total	%
	Top Origin			
1	EDB	Edinburgh	46,530	61.36%
	Top 3 Origins			
1	EDB	Edinburgh	46,530	61.36%
2	HYM	Haymarket	6,464	8.52%
3	SGL	South Gyle	2,752	3.63%
				73.51%
	Top 5 Origins			
1	EDB	Edinburgh	46,530	61.36%
2	HYM	Haymarket	6,464	8.52%
3	SGL	South Gyle	2,752	3.63%
4	INK	Inverkeithing	2,406	3.17%
5	COW	Cowdenbeath	2,403	3.17%
				79.86%
	Top 10 Origins			
1	EDB	Edinburgh	46,530	61.36%
2	HYM	Haymarket	6,464	8.52%
3	SGL	South Gyle	2,752	3.63%
4	INK	Inverkeithing	2,406	3.17%
5	COW	Cowdenbeath	2,403	3.17%
6	KDY	Kirkcaldy	2,095	2.76%
7	DAM	Dalmeny	2,039	2.69%
8	CDD	Cardenden	1,737	2.29%
9	LCG	Lochgelly	786	1.04%
10	DFL	Dunfermline	685	0.90%
				89.54%
	Top 20 Origins			
1	EDB	Edinburgh	46,530	61.36%
2	HYM	Haymarket	6,464	8.52%
3	SGL	South Gyle	2,752	3.63%
4	INK	Inverkeithing	2,406	3.17%
5	COW	Cowdenbeath	2,403	3.17%
6	KDY	Kirkcaldy	2,095	2.76%
7	DAM	Dalmeny	2,039	2.69%
8	CDD	Cardenden	1,737	2.29%
9	LCG	Lochgelly	786	1.04%
10	DFL	Dunfermline	685	0.90%
11	ROS	Rosyth	652	0.86%
12	GLT	Glnrthes Thornt	600	0.79%
13	NQU	North Queensfy	586	0.77%
14	GLQ	Glasgow Queen St	574	0.76%
15	DEE	Dundee	372	0.49%
16	FKK	Falkirk High	368	0.49%
17	BTS	Burntisland	350	0.46%
18	ABD	Aberdeen	307	0.40%
19	FKG	Falkirk Ghston	276	0.36%
20	KGH	Kinghorn	241	0.32%
				95.24%

Glasshoughton

Producer Journeys

Rank	Destination Code	Destination	Total	%
	Top Destination			
1	LDS	Leeds	56,283	83.36%
	Top 3 Destinations			
1	LDS	Leeds	56,283	83.36%
2	KNO	Knottingley	2,300	3.41%
3	WDS	Woodlesford	1,568	2.32%
				89.09%
	Top 5			
1	LDS	Leeds	56,283	83.36%
2	KNO	Knottingley	2,300	3.41%
3	WDS	Woodlesford	1,568	2.32%
4	XPF	Pontefract BR	758	1.12%
5	CFD	Castleford	727	1.08%
				91.29%
	Top 10 Destinations			
1	LDS	Leeds	56,283	83.36%
2	KNO	Knottingley	2,300	3.41%
3	WDS	Woodlesford	1,568	2.32%
4	XPF	Pontefract BR	758	1.12%
5	CFD	Castleford	727	1.08%
6	ILK	Ilkley	660	0.98%
7	HUD	Huddersfield	654	0.97%
8	XWF	Wakefield BR	587	0.87%
9	XBF	Bradford Yks BR	532	0.79%
10	XMC	Manchester BR	462	0.68%
				95.58%
	Top 20 Destinations			
1	LDS	Leeds	56,283	83.36%
2	KNO	Knottingley	2,300	3.41%
3	WDS	Woodlesford	1,568	2.32%
4	XPF	Pontefract BR	758	1.12%
5	CFD	Castleford	727	1.08%
6	ILK	Ilkley	660	0.98%
7	HUD	Huddersfield	654	0.97%
8	XWF	Wakefield BR	587	0.87%
9	XBF	Bradford Yks BR	532	0.79%
10	XMC	Manchester BR	462	0.68%
11	HRS	Horsforth	184	0.27%
12	HFX	Halifax	167	0.25%
13	NPD	New Pudsey	166	0.25%
14	HGT	Harrogate	147	0.22%
15	SON	Steeton & Silsde	139	0.21%
16	KEI	Keighley	133	0.20%
17	HBD	Hebden Bridge	101	0.15%
18	XLD	London BR	97	0.14%
19	HDY	Headingley	85	0.13%
20	BUY	Burley Park	82	0.12%
				97.50%

Attractor Journeys

Rank	Origin Code	Origin Station	Total	%
	Top Origin			
1	LDS	Leeds	31,593	46.63%
	Top 3 Origins			
1	LDS	Leeds	31,593	46.63%
2	KNO	Knottingley	10,170	15.01%
3	WDS	Woodlesford	5,121	7.56%
				69.20%
	Top 5 Origins			
1	LDS	Leeds	31,593	46.63%
2	KNO	Knottingley	10,170	15.01%
3	WDS	Woodlesford	5,121	7.56%
4	XPF	Pontefract BR	1,904	2.81%
5	BDI	Bradford Interch	1,535	2.27%
				74.28%
	Top 10 Origins			
1	LDS	Leeds	31,593	46.63%
2	KNO	Knottingley	10,170	15.01%
3	WDS	Woodlesford	5,121	7.56%
4	XPF	Pontefract BR	1,904	2.81%
5	BDI	Bradford Interch	1,535	2.27%
6	HUD	Huddersfield	1,406	2.08%
7	XWF	Wakefield BR	1,027	1.52%
8	KEI	Keighley	800	1.18%
9	CRG	Cross Gates	718	1.06%
10	SHY	Shipley Yorks	668	0.99%
				81.10%
	Top 20 Origins			
1	LDS	Leeds	31,593	46.63%
2	KNO	Knottingley	10,170	15.01%
3	WDS	Woodlesford	5,121	7.56%
4	XPF	Pontefract BR	1,904	2.81%
5	BDI	Bradford Interch	1,535	2.27%
6	HUD	Huddersfield	1,406	2.08%
7	XWF	Wakefield BR	1,027	1.52%
8	KEI	Keighley	800	1.18%
9	CRG	Cross Gates	718	1.06%
10	SHY	Shipley Yorks	668	0.99%
11	FEA	Featherstone	624	0.92%
12	SHF	Sheffield	602	0.89%
13	HRS	Horsforth	593	0.88%
14	XBF	Bradford Yks BR	569	0.84%
15	CFD	Castleford	529	0.78%
16	DEW	Dewsbury	518	0.76%
17	BUY	Burley Park	445	0.66%
18	NPD	New Pudsey	405	0.60%
19	BIY	Bingley	380	0.56%
20	BDQ	Bradford F Sq	373	0.55%
				88.53%

Kelvindale

Producer Journeys

Rank	Destination Code	Destination	Total	%
	Top Destination			
1	XGG	Glasgow BR	38,576	83.03%
	Top 3 Destinations			
1	XGG	Glasgow BR	38,576	83.03%
2	EDB	Edinburgh	2,299	4.95%
3	PPK	Possilpark	552	1.19%
				89.16%
	Top 5			
1	XGG	Glasgow BR	38,576	83.03%
2	EDB	Edinburgh	2,299	4.95%
3	PPK	Possilpark	552	1.19%
4	SUM	Summerston	447	0.96%
5	STG	Stirling	334	0.72%
				90.84%
	Top 10 Destinations			
1	XGG	Glasgow BR	38,576	83.03%
2	EDB	Edinburgh	2,299	4.95%
3	PPK	Possilpark	552	1.19%
4	SUM	Summerston	447	0.96%
5	STG	Stirling	334	0.72%
6	PTK	Partick	294	0.63%
7	ANL	Anniesland	266	0.57%
8	COA	Coatdyke	241	0.52%
9	CHC	Charing X Glasgw	235	0.51%
10	SPR	Springburn	234	0.50%
				93.58%
	Top 20 Destinations			
1	XGG	Glasgow BR	38,576	83.03%
2	EDB	Edinburgh	2,299	4.95%
3	PPK	Possilpark	552	1.19%
4	SUM	Summerston	447	0.96%
5	STG	Stirling	334	0.72%
6	PTK	Partick	294	0.63%
7	ANL	Anniesland	266	0.57%
8	COA	Coatdyke	241	0.52%
9	CHC	Charing X Glasgw	235	0.51%
10	SPR	Springburn	234	0.50%
11	EXG	Exhib Ctr Glasgw	226	0.49%
12	GSC	Gilshochill	215	0.46%
13	ADR	Airdrie	195	0.42%
14	PYG	Paisley Gil St	185	0.40%
15	ASF	Ashfield	162	0.35%
16	BNL	Barnhill	128	0.28%
17	MFL	Mount Florida	115	0.25%
18	AYR	Ayr	106	0.23%
19	MYH	Maryhill	91	0.20%
20	CCT	Cathcart	87	0.19%
				96.83%

Attractor Journeys

Rank	Origin Code	Origin Station	Total	%
	Top Origin			
1	GSC	Gilshochill	33,342	52.86%
	Top 3 Origins			
1	GSC	Gilshochill	33,342	52.86%
2	PPK	Possilpark	13,600	21.56%
3	GLQ	Glasgow Queen St	12,827	20.34%
				94.76%
	Top 5 Origins			
1	GSC	Gilshochill	33,342	52.86%
2	PPK	Possilpark	13,600	21.56%
3	GLQ	Glasgow Queen St	12,827	20.34%
4	SUM	Summerston	417	0.66%
5	ANL	Anniesland	409	0.65%
				96.07%
	Top 10 Origins			
1	GSC	Gilshochill	33,342	52.86%
2	PPK	Possilpark	13,600	21.56%
3	GLQ	Glasgow Queen St	12,827	20.34%
4	SUM	Summerston	417	0.66%
5	ANL	Anniesland	409	0.65%
6	GLC	Glasgow Central	273	0.43%
7	PTK	Partick	251	0.40%
8	ASF	Ashfield	196	0.31%
9	EDB	Edinburgh	189	0.30%
10	XGG	Glasgow BR	169	0.27%
				97.78%
	Top 20 Origins			
1	GSC	Gilshochill	33,342	52.86%
2	PPK	Possilpark	13,600	21.56%
3	GLQ	Glasgow Queen St	12,827	20.34%
4	SUM	Summerston	417	0.66%
5	ANL	Anniesland	409	0.65%
6	GLC	Glasgow Central	273	0.43%
7	PTK	Partick	251	0.40%
8	ASF	Ashfield	196	0.31%
9	EDB	Edinburgh	189	0.30%
10	XGG	Glasgow BR	169	0.27%
11	EXG	Exhib Ctr Glasgw	112	0.18%
12	MLN	Milngavie	109	0.17%
13	PTW	Prestwick Sclyde	90	0.14%
14	HYN	Hyndland	81	0.13%
15	MYH	Maryhill	69	0.11%
16	HYM	Haymarket	64	0.10%
17	STG	Stirling	52	0.08%
18	BDG	Bridgeton	47	0.07%
19	DMC	Drumchapel	37	0.06%
20	CHC	Charing X Glasgw	35	0.06%
				98.88%

Mitcham Eastfields

Producer Journeys

Rank	Destination Code	Destination	Total	%
	Top Destination			
1	XZA	London Travelcard	52,393	29.65%
	Top 3 Destinations			
1	XZA	London Travelcard	52,393	29.65%
2	XLD	London BR	43,279	24.49%
3	XZB	London Travelcard	14,476	8.19%
				62.33%
	Top 5			
1	XZA	London Travelcard	52,393	29.65%
2	XLD	London BR	43,279	24.49%
3	XZB	London Travelcard	14,476	8.19%
4	CLJ	Clapham Junction	7,890	4.46%
5	SUO	Sutton London	6,941	3.93%
				70.72%
	Top 10 Destinations			
1	XZA	London Travelcard	52,393	29.65%
2	XLD	London BR	43,279	24.49%
3	XZB	London Travelcard	14,476	8.19%
4	CLJ	Clapham Junction	7,890	4.46%
5	SUO	Sutton London	6,941	3.93%
6	BAL	Balham	5,907	3.34%
7	WIM	Wimbledon	4,720	2.67%
8	EPS	Epsom	2,428	1.37%
9	VXH	Vauxhall	1,837	1.04%
10	CSH	Carshalton	1,705	0.96%
				80.11%
	Top 20 Destinations			
1	XZA	London Travelcard	52,393	29.65%
2	XLD	London BR	43,279	24.49%
3	XZB	London Travelcard	14,476	8.19%
4	CLJ	Clapham Junction	7,890	4.46%
5	SUO	Sutton London	6,941	3.93%
6	BAL	Balham	5,907	3.34%
7	WIM	Wimbledon	4,720	2.67%
8	EPS	Epsom	2,428	1.37%
9	VXH	Vauxhall	1,837	1.04%
10	CSH	Carshalton	1,705	0.96%
11	LHD	Leatherhead	1,688	0.96%
12	MIJ	Mitcham Junction	1,668	0.94%
13	HNH	Herne Hill	1,418	0.80%
14	XZC	London Travelcard	1,125	0.64%
15	CHE	Cheam	995	0.56%
16	PUT	Putney	980	0.55%
17	PMR	Peckham Rye	793	0.45%
18	WOK	Woking	787	0.45%
19	EWE	Ewell East	775	0.44%
20	SBM	South Bermondsey	768	0.43%
				86.33%

Attractor Journeys

Rank	Origin Code	Origin Station	Total	%
	Top Origin			
1	XLD	London BR	17,219	45.01%
	Top 3 Origins			
1	XLD	London BR	17,219	45.01%
2	BAL	Balham	3,388	8.86%
3	SUO	Sutton London	2,710	7.08%
				60.95%
	Top 5 Origins			
1	XLD	London BR	17,219	45.01%
2	BAL	Balham	3,388	8.86%
3	SUO	Sutton London	2,710	7.08%
4	CLJ	Clapham Junction	2,181	5.70%
5	HCB	Hackbridge	938	2.45%
				69.10%
	Top 10 Origins			
1	XLD	London BR	17,219	45.01%
2	BAL	Balham	3,388	8.86%
3	SUO	Sutton London	2,710	7.08%
4	CLJ	Clapham Junction	2,181	5.70%
5	HCB	Hackbridge	938	2.45%
6	EPS	Epsom	871	2.28%
7	CSH	Carshalton	558	1.46%
8	CHE	Cheam	459	1.20%
9	LGJ	Loughborough Jn	433	1.13%
10	HNH	Herne Hill	418	1.09%
				76.26%
	Top 20 Origins			
1	XLD	London BR	17,219	45.01%
2	BAL	Balham	3,388	8.86%
3	SUO	Sutton London	2,710	7.08%
4	CLJ	Clapham Junction	2,181	5.70%
5	HCB	Hackbridge	938	2.45%
6	EPS	Epsom	871	2.28%
7	CSH	Carshalton	558	1.46%
8	CHE	Cheam	459	1.20%
9	LGJ	Loughborough Jn	433	1.13%
10	HNH	Herne Hill	418	1.09%
11	WIM	Wimbledon	388	1.01%
12	TUH	Tulse Hill	318	0.83%
13	FPK	Finsbury Park	312	0.82%
14	PMR	Peckham Rye	287	0.75%
15	PUT	Putney	277	0.72%
16	STE	Streatham	273	0.71%
17	QRP	Queens Rd Peckhm	270	0.71%
18	GTW	Gatwick Airport	247	0.65%
19	LHD	Leatherhead	230	0.60%
20	CRW	Crawley	227	0.59%
				83.65%

Coleshill Parkway

Producer Journeys

Rank	Destination Code	Destination	Total	%
	Top Destination			
1	XBH	Birmingham BR	65,527	79.66%
	Top 3 Destinations			
1	XBH	Birmingham BR	65,527	79.66%
2	NUN	Nuneaton	5,605	6.81%
3	LEI	Leicester	2,644	3.21%
				89.69%
	Top 5			
1	XBH	Birmingham BR	65,527	79.66%
2	NUN	Nuneaton	5,605	6.81%
3	LEI	Leicester	2,644	3.21%
4	UNI	University Birm	1,294	1.57%
5	BHM	Birmingham N St	992	1.21%
				92.47%
	Top 10 Destinations			
1	XBH	Birmingham BR	65,527	79.66%
2	NUN	Nuneaton	5,605	6.81%
3	LEI	Leicester	2,644	3.21%
4	UNI	University Birm	1,294	1.57%
5	BHM	Birmingham N St	992	1.21%
6	WVH	Wolverhampton	313	0.38%
7	PBO	Peterborough	296	0.36%
8	SGB	Smethwick Gal Bg	264	0.32%
9	FWY	Five Ways	244	0.30%
10	WTO	Water Orton	238	0.29%
				94.12%
	Top 20 Destinations			
1	XBH	Birmingham BR	65,527	79.66%
2	NUN	Nuneaton	5,605	6.81%
3	LEI	Leicester	2,644	3.21%
4	UNI	University Birm	1,294	1.57%
5	BHM	Birmingham N St	992	1.21%
6	WVH	Wolverhampton	313	0.38%
7	PBO	Peterborough	296	0.36%
8	SGB	Smethwick Gal Bg	264	0.32%
9	FWY	Five Ways	244	0.30%
10	WTO	Water Orton	238	0.29%
11	NOT	Nottingham	199	0.24%
12	HNK	Hinckley Leics	183	0.22%
13	XLD	London BR	179	0.22%
14	BSC	Bescot Stadium	167	0.20%
15	MMO	Melton Mowbray	166	0.20%
16	CBG	Cambridge	165	0.20%
17	XWT	Worcester BR	157	0.19%
18	DBY	Derby	126	0.15%
19	COV	Coventry	116	0.14%
20	SSD	Stansted Airport	100	0.12%
				96.01%

Attractor Journeys

Rank	Origin Code	Origin Station	Total	%
	Top Origin			
1	BHM	Birmingham N St	10,396	46.56%
	Top 3 Origins			
1	BHM	Birmingham N St	10,396	46.56%
2	NUN	Nuneaton	1,836	8.22%
3	XBH	Birmingham BR	1,099	4.92%
				59.71%
	Top 5 Origins			
1	BHM	Birmingham N St	10,396	46.56%
2	NUN	Nuneaton	1,836	8.22%
3	XBH	Birmingham BR	1,099	4.92%
4	LEI	Leicester	896	4.01%
5	LBO	Loughboro Leics	472	2.11%
				65.84%
	Top 10 Origins			
1	BHM	Birmingham N St	10,396	46.56%
2	NUN	Nuneaton	1,836	8.22%
3	XBH	Birmingham BR	1,099	4.92%
4	LEI	Leicester	896	4.01%
5	LBO	Loughboro Leics	472	2.11%
6	DDP	Dudley Port	381	1.71%
7	WVH	Wolverhampton	356	1.59%
8	XLD	London BR	329	1.47%
9	HNK	Hinckley Leics	297	1.33%
10	BUT	Burton On Trent	277	1.24%
				73.18%
	Top 20 Origins			
1	BHM	Birmingham N St	10,396	46.56%
2	NUN	Nuneaton	1,836	8.22%
3	XBH	Birmingham BR	1,099	4.92%
4	LEI	Leicester	896	4.01%
5	LBO	Loughboro Leics	472	2.11%
6	DDP	Dudley Port	381	1.71%
7	WVH	Wolverhampton	356	1.59%
8	XLD	London BR	329	1.47%
9	HNK	Hinckley Leics	297	1.33%
10	BUT	Burton On Trent	277	1.24%
11	FWY	Five Ways	237	1.06%
12	UNI	University Birm	211	0.95%
13	CBG	Cambridge	187	0.84%
14	COV	Coventry	169	0.76%
15	SAD	Sandwell & Dudly	169	0.76%
16	SLY	Selly Oak	165	0.74%
17	KID	Kidderminster	158	0.71%
18	LIC	Lichfield City	143	0.64%
19	PBO	Peterborough	140	0.63%
20	NOT	Nottingham	139	0.62%
				80.88%

Warwick Parkway

Producer Journeys

Rank	Destination Code	Destination	Total	%
	Top Destination			
1	XLD	London BR	140,830	33.35%
	Top 3 Destinations			
1	XLD	London BR	140,830	33.35%
2	XZA	London Travelcard	131,129	31.05%
3	XBH	Birmingham BR	92,838	21.98%
				86.38%
	Top 5			
1	XLD	London BR	140,830	33.35%
2	XZA	London Travelcard	131,129	31.05%
3	XBH	Birmingham BR	92,838	21.98%
4	LMS	Leamington Spa	9,597	2.27%
5	SOL	Solihull	7,529	1.78%
				90.43%
	Top 10 Destinations			
1	XLD	London BR	140,830	33.35%
2	XZA	London Travelcard	131,129	31.05%
3	XBH	Birmingham BR	92,838	21.98%
4	LMS	Leamington Spa	9,597	2.27%
5	SOL	Solihull	7,529	1.78%
6	XUA	London Travelcard	7,425	1.76%
7	WCX	Wembley Stadium	3,683	0.87%
8	OXF	Oxford	2,051	0.49%
9	BAN	Banbury	1,870	0.44%
10	WRW	Warwick	1,863	0.44%
				94.43%
	Top 20 Destinations			
1	XLD	London BR	140,830	33.35%
2	XZA	London Travelcard	131,129	31.05%
3	XBH	Birmingham BR	92,838	21.98%
4	LMS	Leamington Spa	9,597	2.27%
5	SOL	Solihull	7,529	1.78%
6	XUA	London Travelcard	7,425	1.76%
7	WCX	Wembley Stadium	3,683	0.87%
8	OXF	Oxford	2,051	0.49%
9	BAN	Banbury	1,870	0.44%
10	WRW	Warwick	1,863	0.44%
11	DDG	Dorridge	1,614	0.38%
12	UNI	University Birm	1,439	0.34%
13	HWY	High Wycombe	1,195	0.28%
14	COV	Coventry	1,189	0.28%
15	RDG	Reading	1,100	0.26%
16	BHI	Birmingham Intl	856	0.20%
17	XMC	Manchester BR	821	0.19%
18	JEQ	Jewellry Quarter	758	0.18%
19	BCS	Bicester	712	0.17%
20	OLT	Olton	437	0.10%
				96.83%

Attractor Journeys

Rank	Origin Code	Origin Station	Total	%
	Top Origin			
1	XLD	London BR	40,707	56.29%
	Top 3 Origins			
1	XLD	London BR	40,707	56.29%
2	LMS	Leamington Spa	6,092	8.42%
3	BMO	Birmingham M St	2,625	3.63%
				68.34%
	Top 5 Origins			
1	XLD	London BR	40,707	56.29%
2	LMS	Leamington Spa	6,092	8.42%
3	BMO	Birmingham M St	2,625	3.63%
4	DDG	Dorridge	2,093	2.89%
5	SOL	Solihull	1,697	2.35%
				73.59%
	Top 10 Origins			
1	XLD	London BR	40,707	56.29%
2	LMS	Leamington Spa	6,092	8.42%
3	BMO	Birmingham M St	2,625	3.63%
4	DDG	Dorridge	2,093	2.89%
5	SOL	Solihull	1,697	2.35%
6	BSW	Bham Snow Hill	1,658	2.29%
7	BAN	Banbury	1,611	2.23%
8	XBH	Birmingham BR	968	1.34%
9	COV	Coventry	789	1.09%
10	WRW	Warwick	725	1.00%
				81.54%
	Top 20 Origins			
1	XLD	London BR	40,707	56.29%
2	LMS	Leamington Spa	6,092	8.42%
3	BMO	Birmingham M St	2,625	3.63%
4	DDG	Dorridge	2,093	2.89%
5	SOL	Solihull	1,697	2.35%
6	BSW	Bham Snow Hill	1,658	2.29%
7	BAN	Banbury	1,611	2.23%
8	XBH	Birmingham BR	968	1.34%
9	COV	Coventry	789	1.09%
10	WRW	Warwick	725	1.00%
11	HWY	High Wycombe	460	0.64%
12	OXF	Oxford	430	0.59%
13	WLN	Wellington Salop	402	0.56%
14	WRU	West Ruislip	360	0.50%
15	BCS	Bicester	274	0.38%
16	RDG	Reading	249	0.34%
17	OLT	Olton	236	0.33%
18	BHI	Birmingham Intl	227	0.31%
19	XUA	London Travelcard	216	0.30%
20	SAV	Stratford U Avon	196	0.27%
				85.76%

Edinburgh Park

Producer Journeys

Rank	Destination Code	Destination	Total	%
	Top Destination			
1	EDB	Edinburgh	50,236	46.03%
	Top 3 Destinations			
1	EDB	Edinburgh	50,236	46.03%
2	BHG	Bathgate	8,259	7.57%
3	LSN	Livingston North	7,422	6.80%
				60.40%
	Top 5			
1	EDB	Edinburgh	50,236	46.03%
2	BHG	Bathgate	8,259	7.57%
3	LSN	Livingston North	7,422	6.80%
4	STG	Stirling	4,664	4.27%
5	XGG	Glasgow BR	4,634	4.25%
				68.91%
	Top 10 Destinations			
1	EDB	Edinburgh	50,236	46.03%
2	BHG	Bathgate	8,259	7.57%
3	LSN	Livingston North	7,422	6.80%
4	STG	Stirling	4,664	4.27%
5	XGG	Glasgow BR	4,634	4.25%
6	LIN	Linlithgow	4,572	4.19%
7	HYM	Haymarket	3,887	3.56%
8	BSU	Brunstane	3,813	3.49%
9	UHA	Uphall	2,834	2.60%
10	XFK	Falkirk BR	2,678	2.45%
				85.21%
	Top 20 Destinations			
1	EDB	Edinburgh	50,236	46.03%
2	BHG	Bathgate	8,259	7.57%
3	LSN	Livingston North	7,422	6.80%
4	STG	Stirling	4,664	4.27%
5	XGG	Glasgow BR	4,634	4.25%
6	LIN	Linlithgow	4,572	4.19%
7	HYM	Haymarket	3,887	3.56%
8	BSU	Brunstane	3,813	3.49%
9	UHA	Uphall	2,834	2.60%
10	XFK	Falkirk BR	2,678	2.45%
11	NEW	Newcraighall	2,356	2.16%
12	MUB	Musselburgh	2,089	1.91%
13	PMT	Polmont	1,535	1.41%
14	BEA	Bridge Of Allan	1,233	1.13%
15	WAF	Wallyford	892	0.82%
16	PST	Prestonpans	876	0.80%
17	LBT	Larbert	738	0.68%
18	DBL	Dunblane	572	0.52%
19	DRM	Drem	541	0.50%
20	NBW	North Berwick	474	0.43%
				95.57%

Attractor Journeys

Rank	Origin Code	Origin Station	Total	%
	Top Origin			
1	EDB	Edinburgh	70,911	21.81%
	Top 3 Origins			
1	EDB	Edinburgh	70,911	21.81%
2	LIN	Linlithgow	33,974	10.45%
3	BHG	Bathgate	20,589	6.33%
				38.59%
	Top 5 Origins			
1	EDB	Edinburgh	70,911	21.81%
2	LIN	Linlithgow	33,974	10.45%
3	BHG	Bathgate	20,589	6.33%
4	LSN	Livingston North	20,305	6.24%
5	HYM	Haymarket	19,719	6.06%
				50.90%
	Top 10 Origins			
1	EDB	Edinburgh	70,911	21.81%
2	LIN	Linlithgow	33,974	10.45%
3	BHG	Bathgate	20,589	6.33%
4	LSN	Livingston North	20,305	6.24%
5	HYM	Haymarket	19,719	6.06%
6	PMT	Polmont	18,569	5.71%
7	FKG	Falkirk Ghston	15,580	4.79%
8	STG	Stirling	15,258	4.69%
9	BSU	Brunstane	11,684	3.59%
10	LBT	Larbert	9,755	3.00%
				72.68%
	Top 20 Origins			
1	EDB	Edinburgh	70,911	21.81%
2	LIN	Linlithgow	33,974	10.45%
3	BHG	Bathgate	20,589	6.33%
4	LSN	Livingston North	20,305	6.24%
5	HYM	Haymarket	19,719	6.06%
6	PMT	Polmont	18,569	5.71%
7	FKG	Falkirk Ghston	15,580	4.79%
8	STG	Stirling	15,258	4.69%
9	BSU	Brunstane	11,684	3.59%
10	LBT	Larbert	9,755	3.00%
11	NEW	Newcraighall	9,531	2.93%
12	UHA	Uphall	8,387	2.58%
13	DUN	Dunbar	8,186	2.52%
14	GLQ	Glasgow Queen St	7,008	2.16%
15	MUB	Musselburgh	5,708	1.76%
16	CMO	Camelon	5,494	1.69%
17	WAF	Wallyford	4,332	1.33%
18	BEA	Bridge Of Allan	4,209	1.29%
19	NBW	North Berwick	3,900	1.20%
20	PST	Prestonpans	2,849	0.88%
				91.01%

Braintree Freeport

Producer Journeys

Rank	Destination Code	Destination	Total	%
	Top Destination			
1	XLD	London BR	9,088	28.38%
	Top 3 Destinations			
1	XLD	London BR	9,088	28.38%
2	XZA	London Travelcard	8,748	27.32%
3	CHM	Chelmsford Essex	6,286	19.63%
				75.33%
	Top 5			
1	XLD	London BR	9,088	28.38%
2	XZA	London Travelcard	8,748	27.32%
3	CHM	Chelmsford Essex	6,286	19.63%
4	WTM	Witham	3,087	9.64%
5	COL	Colchester	978	3.05%
				88.02%
	Top 10 Destinations			
1	XLD	London BR	9,088	28.38%
2	XZA	London Travelcard	8,748	27.32%
3	CHM	Chelmsford Essex	6,286	19.63%
4	WTM	Witham	3,087	9.64%
5	COL	Colchester	978	3.05%
6	SRA	Stratford London	888	2.77%
7	RMF	Romford	304	0.95%
8	BRE	Brentwood	291	0.91%
9	SNF	Shenfield	201	0.63%
10	XUA	London Travelcard	183	0.57%
				93.85%
	Top 20 Destinations			
1	XLD	London BR	9,088	28.38%
2	XZA	London Travelcard	8,748	27.32%
3	CHM	Chelmsford Essex	6,286	19.63%
4	WTM	Witham	3,087	9.64%
5	COL	Colchester	978	3.05%
6	SRA	Stratford London	888	2.77%
7	RMF	Romford	304	0.95%
8	BRE	Brentwood	291	0.91%
9	SNF	Shenfield	201	0.63%
10	XUA	London Travelcard	183	0.57%
11	BTR	Braintree	174	0.54%
12	HAP	Hatfield Peverel	150	0.47%
13	XSE	Southend BR	129	0.40%
14	INT	Ingatestone	104	0.32%
15	WNY	White Notley	101	0.32%
16	CLT	Clacton	98	0.31%
17	HRO	Harold Wood	69	0.22%
18	GDP	Gidea Park	61	0.19%
19	CES	Cressing Essex	58	0.18%
20	IPS	Ipswich	54	0.17%
				96.97%

Attractor Journeys

Rank	Origin Code	Origin Station	Total	%
	Top Origin			
1	XLD	London BR	3,899	18.03%
	Top 3 Origins			
1	XLD	London BR	3,899	18.03%
2	CHM	Chelmsford Essex	3,145	14.54%
3	COL	Colchester	2,952	13.65%
				46.21%
	Top 5 Origins			
1	XLD	London BR	3,899	18.03%
2	CHM	Chelmsford Essex	3,145	14.54%
3	COL	Colchester	2,952	13.65%
4	WTM	Witham	2,692	12.45%
5	SRA	Stratford London	1,372	6.34%
				65.00%
	Top 10 Origins			
1	XLD	London BR	3,899	18.03%
2	CHM	Chelmsford Essex	3,145	14.54%
3	COL	Colchester	2,952	13.65%
4	WTM	Witham	2,692	12.45%
5	SRA	Stratford London	1,372	6.34%
6	BTR	Braintree	764	3.53%
7	XUA	London Travelcard	578	2.67%
8	CLT	Clacton	571	2.64%
9	RMF	Romford	552	2.55%
10	SNF	Shenfield	531	2.45%
				78.85%
	Top 20 Origins			
1	XLD	London BR	3,899	18.03%
2	CHM	Chelmsford Essex	3,145	14.54%
3	COL	Colchester	2,952	13.65%
4	WTM	Witham	2,692	12.45%
5	SRA	Stratford London	1,372	6.34%
6	BTR	Braintree	764	3.53%
7	XUA	London Travelcard	578	2.67%
8	CLT	Clacton	571	2.64%
9	RMF	Romford	552	2.55%
10	SNF	Shenfield	531	2.45%
11	HAP	Hatfield Peverel	436	2.02%
12	IPS	Ipswich	388	1.79%
13	CET	Colchester Town	358	1.66%
14	KEL	Kelvedon	243	1.12%
15	BRE	Brentwood	228	1.05%
16	SUY	Sudbury Suffolk	193	0.89%
17	GDP	Gidea Park	190	0.88%
18	SOV	Southend Vic	163	0.75%
19	MKT	Marks Tey	158	0.73%
20	INT	Ingatestone	152	0.70%
				90.45%

Brunstane

Producer Journeys

Rank	Destination Code	Destination	Total	%
	Top Destination			
1	EDB	Edinburgh	52,033	55.63%
	Top 3 Destinations			
1	EDB	Edinburgh	52,033	55.63%
2	HYM	Haymarket	15,574	16.65%
3	EDP	Edinburgh Park	11,684	12.49%
				84.77%
	Top 5			
1	EDB	Edinburgh	52,033	55.63%
2	HYM	Haymarket	15,574	16.65%
3	EDP	Edinburgh Park	11,684	12.49%
4	SGL	South Gyle	4,541	4.85%
5	XGG	Glasgow BR	3,101	3.32%
				92.94%
	Top 10 Destinations			
1	EDB	Edinburgh	52,033	55.63%
2	HYM	Haymarket	15,574	16.65%
3	EDP	Edinburgh Park	11,684	12.49%
4	SGL	South Gyle	4,541	4.85%
5	XGG	Glasgow BR	3,101	3.32%
6	STG	Stirling	784	0.84%
7	LSN	Livingston North	672	0.72%
8	XFK	Falkirk BR	526	0.56%
9	LIN	Linlithgow	480	0.51%
10	BHG	Bathgate	457	0.49%
				96.06%
	Top 20 Destinations			
1	EDB	Edinburgh	52,033	55.63%
2	HYM	Haymarket	15,574	16.65%
3	EDP	Edinburgh Park	11,684	12.49%
4	SGL	South Gyle	4,541	4.85%
5	XGG	Glasgow BR	3,101	3.32%
6	STG	Stirling	784	0.84%
7	LSN	Livingston North	672	0.72%
8	XFK	Falkirk BR	526	0.56%
9	LIN	Linlithgow	480	0.51%
10	BHG	Bathgate	457	0.49%
11	DFL	Dunfermline	290	0.31%
12	DAM	Dalmeny	278	0.30%
13	KDY	Kirkcaldy	235	0.25%
14	INK	Inverkeithing	223	0.24%
15	DEE	Dundee	216	0.23%
16	BEA	Bridge Of Allan	207	0.22%
17	LEU	Leuchars	169	0.18%
18	ROS	Rosyth	130	0.14%
19	PMT	Polmont	108	0.12%
20	DBL	Dunblane	98	0.10%
				98.15%

Attractor Journeys

Rank	Origin Code	Origin Station	Total	%
	Top Origin			
1	EDB	Edinburgh	22,326	53.65%
	Top 3 Origins			
1	EDB	Edinburgh	22,326	53.65%
2	HYM	Haymarket	8,085	19.43%
3	EDP	Edinburgh Park	3,813	9.16%
				82.24%
	Top 5 Origins			
1	EDB	Edinburgh	22,326	53.65%
2	HYM	Haymarket	8,085	19.43%
3	EDP	Edinburgh Park	3,813	9.16%
4	BHG	Bathgate	1,064	2.56%
5	LSN	Livingston North	986	2.37%
				87.16%
	Top 10 Origins			
1	EDB	Edinburgh	22,326	53.65%
2	HYM	Haymarket	8,085	19.43%
3	EDP	Edinburgh Park	3,813	9.16%
4	BHG	Bathgate	1,064	2.56%
5	LSN	Livingston North	986	2.37%
6	SGL	South Gyle	709	1.70%
7	FKK	Falkirk High	579	1.39%
8	ROS	Rosyth	524	1.26%
9	GLQ	Glasgow Queen St	501	1.20%
10	LIN	Linlithgow	498	1.20%
				93.92%
	Top 20 Origins			
1	EDB	Edinburgh	22,326	53.65%
2	HYM	Haymarket	8,085	19.43%
3	EDP	Edinburgh Park	3,813	9.16%
4	BHG	Bathgate	1,064	2.56%
5	LSN	Livingston North	986	2.37%
6	SGL	South Gyle	709	1.70%
7	FKK	Falkirk High	579	1.39%
8	ROS	Rosyth	524	1.26%
9	GLQ	Glasgow Queen St	501	1.20%
10	LIN	Linlithgow	498	1.20%
11	PMT	Polmont	268	0.64%
12	CUP	Cupar	259	0.62%
13	STG	Stirling	184	0.44%
14	UHA	Uphall	180	0.43%
15	KDY	Kirkcaldy	119	0.29%
16	INK	Inverkeithing	113	0.27%
17	KGH	Kinghorn	98	0.24%
18	XFK	Falkirk BR	94	0.23%
19	DAM	Dalmeny	80	0.19%
20	FKG	Falkirk Ghston	74	0.18%
				97.45%

Risca & Pontyminster

Producer Journeys

Rank	Destination Code	Destination	Total	%
	Top Destination			
1	CDF	Cardiff Central	66,144	79.85%
	Top 3 Destinations			
1	CDF	Cardiff Central	66,144	79.85%
2	CDQ	Cardiff Queen St	4,241	5.12%
3	NBE	Newbridge	2,671	3.22%
				88.20%
	Top 5			
1	CDF	Cardiff Central	66,144	79.85%
2	CDQ	Cardiff Queen St	4,241	5.12%
3	NBE	Newbridge	2,671	3.22%
4	EBV	Ebbw Vale Parkway	2,434	2.94%
5	CDB	Cardiff Bay	1,181	1.43%
				92.56%
	Top 10 Destinations			
1	CDF	Cardiff Central	66,144	79.85%
2	CDQ	Cardiff Queen St	4,241	5.12%
3	NBE	Newbridge	2,671	3.22%
4	EBV	Ebbw Vale Parkway	2,434	2.94%
5	CDB	Cardiff Bay	1,181	1.43%
6	CKY	Crosskeys	1,003	1.21%
7	LTH	Llanhilleth	633	0.76%
8	BYI	Barry Island	626	0.76%
9	CYS	Cathays	623	0.75%
10	BRY	Barry	342	0.41%
				96.46%
	Top 20 Destinations			
1	CDF	Cardiff Central	66,144	79.85%
2	CDQ	Cardiff Queen St	4,241	5.12%
3	NBE	Newbridge	2,671	3.22%
4	EBV	Ebbw Vale Parkway	2,434	2.94%
5	CDB	Cardiff Bay	1,181	1.43%
6	CKY	Crosskeys	1,003	1.21%
7	LTH	Llanhilleth	633	0.76%
8	BYI	Barry Island	626	0.76%
9	CYS	Cathays	623	0.75%
10	BRY	Barry	342	0.41%
11	ROR	Rogerstone	321	0.39%
12	GTN	Grangetown Glam	320	0.39%
13	NNP	Ninian Park	233	0.28%
14	BGN	Bridgend	233	0.28%
15	PPD	Pontypridd	233	0.28%
16	SWA	Swansea	183	0.22%
17	BYD	Barry Docks	163	0.20%
18	LLS	Llanishen	107	0.13%
19	TRF	Trefforest	93	0.11%
20	HHL	Heath High Level	86	0.10%
				98.84%

Attractor Journeys

Rank	Origin Code	Origin Station	Total	%
	Top Origin			
1	SWA	Swansea	9,844	52.39%
	Top 3 Origins			
1	SWA	Swansea	9,844	52.39%
2	PTD	Pontarddulais	2,247	11.96%
3	NTH	Neath	1,633	8.69%
				73.04%
	Top 5 Origins			
1	SWA	Swansea	9,844	52.39%
2	PTD	Pontarddulais	2,247	11.96%
3	NTH	Neath	1,633	8.69%
4	HVF	Haverfordwest	1,077	5.73%
5	LTH	Llanhilleth	892	4.75%
				83.52%
	Top 10 Origins			
1	SWA	Swansea	9,844	52.39%
2	PTD	Pontarddulais	2,247	11.96%
3	NTH	Neath	1,633	8.69%
4	HVF	Haverfordwest	1,077	5.73%
5	LTH	Llanhilleth	892	4.75%
6	ROR	Rogerstone	594	3.16%
7	CKY	Crosskeys	288	1.53%
8	EBV	Ebbw Vale Parkway	263	1.40%
9	NBE	Newbridge	232	1.23%
10	LLS	Llanishen	226	1.20%
				92.05%
	Top 20 Origins			
1	SWA	Swansea	9,844	52.39%
2	PTD	Pontarddulais	2,247	11.96%
3	NTH	Neath	1,633	8.69%
4	HVF	Haverfordwest	1,077	5.73%
5	LTH	Llanhilleth	892	4.75%
6	ROR	Rogerstone	594	3.16%
7	CKY	Crosskeys	288	1.53%
8	EBV	Ebbw Vale Parkway	263	1.40%
9	NBE	Newbridge	232	1.23%
10	LLS	Llanishen	226	1.20%
11	CDQ	Cardiff Queen St	110	0.59%
12	CDF	Cardiff Central	108	0.57%
13	CPH	Caerphilly	104	0.55%
14	CYS	Cathays	88	0.47%
15	XBH	Birmingham BR	81	0.43%
16	COV	Coventry	67	0.36%
17	SHF	Sheffield	59	0.31%
18	CPT	Clapton	58	0.31%
19	SAL	Salisbury	58	0.31%
20	XLD	London BR	55	0.29%
				96.24%

Alloa

Producer Journeys

Rank	Destination Code	Destination	Total	%
	Top Destination			
1	STG	Stirling	117,896	46.40%
	Top 3 Destinations			
1	STG	Stirling	117,896	46.40%
2	XGG	Glasgow BR	92,119	36.25%
3	EDB	Edinburgh	20,946	8.24%
				90.89%
	Top 5			
1	STG	Stirling	117,896	46.40%
2	XGG	Glasgow BR	92,119	36.25%
3	EDB	Edinburgh	20,946	8.24%
4	XFK	Falkirk BR	3,345	1.32%
5	LBT	Larbert	2,251	0.89%
				93.10%
	Top 10 Destinations			
1	STG	Stirling	117,896	46.40%
2	XGG	Glasgow BR	92,119	36.25%
3	EDB	Edinburgh	20,946	8.24%
4	XFK	Falkirk BR	3,345	1.32%
5	LBT	Larbert	2,251	0.89%
6	DBL	Dunblane	2,041	0.80%
7	CHC	Charing X Glasgw	1,465	0.58%
8	EDP	Edinburgh Park	983	0.39%
9	PTH	Perth	765	0.30%
10	DEE	Dundee	615	0.24%
				95.41%
	Top 20 Destinations			
1	STG	Stirling	117,896	46.40%
2	XGG	Glasgow BR	92,119	36.25%
3	EDB	Edinburgh	20,946	8.24%
4	XFK	Falkirk BR	3,345	1.32%
5	LBT	Larbert	2,251	0.89%
6	DBL	Dunblane	2,041	0.80%
7	CHC	Charing X Glasgw	1,465	0.58%
8	EDP	Edinburgh Park	983	0.39%
9	PTH	Perth	765	0.30%
10	DEE	Dundee	615	0.24%
11	CDO	Cardonald	611	0.24%
12	SLA	Slateford	605	0.24%
13	BBG	Bishopbriggs	585	0.23%
14	ANL	Anniesland	444	0.17%
15	LNZ	Lenzie	436	0.17%
16	CRO	Croy	380	0.15%
17	CMO	Camelon	353	0.14%
18	HYM	Haymarket	349	0.14%
19	EXG	Exhib Ctr Glasgw	338	0.13%
20	MFL	Mount Florida	325	0.13%
				97.15%

Attractor Journeys

Rank	Origin Code	Origin Station	Total	%
	Top Origin			
1	STG	Stirling	36,849	45.07%
	Top 3 Origins			
1	STG	Stirling	36,849	45.07%
2	GLQ	Glasgow Queen St	22,706	27.77%
3	EDB	Edinburgh	3,978	4.87%
				77.71%
	Top 5 Origins			
1	STG	Stirling	36,849	45.07%
2	GLQ	Glasgow Queen St	22,706	27.77%
3	EDB	Edinburgh	3,978	4.87%
4	LBT	Larbert	2,343	2.87%
5	HYM	Haymarket	1,466	1.79%
				82.37%
	Top 10 Origins			
1	STG	Stirling	36,849	45.07%
2	GLQ	Glasgow Queen St	22,706	27.77%
3	EDB	Edinburgh	3,978	4.87%
4	LBT	Larbert	2,343	2.87%
5	HYM	Haymarket	1,466	1.79%
6	DBL	Dunblane	1,361	1.66%
7	LNZ	Lenzie	923	1.13%
8	XGG	Glasgow BR	821	1.00%
9	CRO	Croy	726	0.89%
10	FKG	Falkirk Ghston	692	0.85%
				87.91%
	Top 20 Origins			
1	STG	Stirling	36,849	45.07%
2	GLQ	Glasgow Queen St	22,706	27.77%
3	EDB	Edinburgh	3,978	4.87%
4	LBT	Larbert	2,343	2.87%
5	HYM	Haymarket	1,466	1.79%
6	DBL	Dunblane	1,361	1.66%
7	LNZ	Lenzie	923	1.13%
8	XGG	Glasgow BR	821	1.00%
9	CRO	Croy	726	0.89%
10	FKG	Falkirk Ghston	692	0.85%
11	PTH	Perth	588	0.72%
12	BBG	Bishopbriggs	439	0.54%
13	DEE	Dundee	398	0.49%
14	XFK	Falkirk BR	380	0.46%
15	CMO	Camelon	353	0.43%
16	LIN	Linlithgow	340	0.42%
17	GLC	Glasgow Central	326	0.40%
18	BEA	Bridge Of Allan	292	0.36%
19	ADR	Airdrie	281	0.34%
20	ABD	Aberdeen	267	0.33%
				92.39%

Larkhall

Producer Journeys

Rank	Destination Code	Destination	Total	%
	Top Destination			
1	XGG	Glasgow BR	132,073	50.80%
	Top 3 Destinations			
1	XGG	Glasgow BR	132,073	50.80%
2	HNC	Hamilton Central	23,312	8.97%
3	AGS	Argyle Street	22,598	8.69%
				68.46%
	Top 5			
1	XGG	Glasgow BR	132,073	50.80%
2	HNC	Hamilton Central	23,312	8.97%
3	AGS	Argyle Street	22,598	8.69%
4	AND	Anderston	20,016	7.70%
5	HNW	Hamilton West	15,770	6.07%
				82.23%
	Top 10 Destinations			
1	XGG	Glasgow BR	132,073	50.80%
2	HNC	Hamilton Central	23,312	8.97%
3	AGS	Argyle Street	22,598	8.69%
4	AND	Anderston	20,016	7.70%
5	HNW	Hamilton West	15,770	6.07%
6	EXG	Exhib Ctr Glasgw	8,549	3.29%
7	PTK	Partick	4,524	1.74%
8	HYN	Hyndland	3,706	1.43%
9	RUT	Rutherglen	2,937	1.13%
10	JOR	Jordanhill	2,671	1.03%
				90.84%
	Top 20 Destinations			
1	XGG	Glasgow BR	132,073	50.80%
2	HNC	Hamilton Central	23,312	8.97%
3	AGS	Argyle Street	22,598	8.69%
4	AND	Anderston	20,016	7.70%
5	HNW	Hamilton West	15,770	6.07%
6	EXG	Exhib Ctr Glasgw	8,549	3.29%
7	PTK	Partick	4,524	1.74%
8	HYN	Hyndland	3,706	1.43%
9	RUT	Rutherglen	2,937	1.13%
10	JOR	Jordanhill	2,671	1.03%
11	BLT	Blantyre	2,606	1.00%
12	PYG	Paisley Gil St	2,461	0.95%
13	DMR	Dalmuir	1,702	0.65%
14	CTE	Chatelherault	1,494	0.57%
15	SIN	Singer	861	0.33%
16	MFL	Mount Florida	827	0.32%
17	ANL	Anniesland	758	0.29%
18	EDB	Edinburgh	696	0.27%
19	SPR	Springburn	614	0.24%
20	PLE	Pollokshields E	593	0.23%
				95.69%

Attractor Journeys

Rank	Origin Code	Origin Station	Total	%
	Top Origin			
1	GLC	Glasgow Central	23,243	31.20%
	Top 3 Origins			
1	GLC	Glasgow Central	23,243	31.20%
2	HNC	Hamilton Central	9,310	12.50%
3	XGG	Glasgow BR	9,188	12.33%
				56.03%
	Top 5 Origins			
1	GLC	Glasgow Central	23,243	31.20%
2	HNC	Hamilton Central	9,310	12.50%
3	XGG	Glasgow BR	9,188	12.33%
4	AGS	Argyle Street	7,125	9.56%
5	HNW	Hamilton West	3,950	5.30%
				70.89%
	Top 10 Origins			
1	GLC	Glasgow Central	23,243	31.20%
2	HNC	Hamilton Central	9,310	12.50%
3	XGG	Glasgow BR	9,188	12.33%
4	AGS	Argyle Street	7,125	9.56%
5	HNW	Hamilton West	3,950	5.30%
6	AND	Anderston	3,067	4.12%
7	BLT	Blantyre	2,054	2.76%
8	RUT	Rutherglen	1,878	2.52%
9	EXG	Exhib Ctr Glasgw	1,654	2.22%
10	PTK	Partick	1,550	2.08%
				84.59%
	Top 20 Origins			
1	GLC	Glasgow Central	23,243	31.20%
2	HNC	Hamilton Central	9,310	12.50%
3	XGG	Glasgow BR	9,188	12.33%
4	AGS	Argyle Street	7,125	9.56%
5	HNW	Hamilton West	3,950	5.30%
6	AND	Anderston	3,067	4.12%
7	BLT	Blantyre	2,054	2.76%
8	RUT	Rutherglen	1,878	2.52%
9	EXG	Exhib Ctr Glasgw	1,654	2.22%
10	PTK	Partick	1,550	2.08%
11	PYG	Paisley Gil St	848	1.14%
12	CTE	Chatelherault	719	0.97%
13	WES	Westerton	578	0.78%
14	MTH	Motherwell	536	0.72%
15	MFL	Mount Florida	469	0.63%
16	HYN	Hyndland	453	0.61%
17	CRO	Croy	359	0.48%
18	DMR	Dalmuir	331	0.44%
19	ANL	Anniesland	300	0.40%
20	BDG	Bridgeton	286	0.38%
				91.14%

Merryton

Producer Journeys

Rank	Destination Code	Destination	Total	%
	Top Destination			
1	XGG	Glasgow BR	46,240	55.67%
	Top 3 Destinations			
1	XGG	Glasgow BR	46,240	55.67%
2	AND	Anderston	9,612	11.57%
3	AGS	Argyle Street	8,219	9.89%
				77.13%
	Top 5			
1	XGG	Glasgow BR	46,240	55.67%
2	AND	Anderston	9,612	11.57%
3	AGS	Argyle Street	8,219	9.89%
4	HNC	Hamilton Central	4,471	5.38%
5	EXG	Exhib Ctr Glasgw	3,162	3.81%
				86.32%
	Top 10 Destinations			
1	XGG	Glasgow BR	46,240	55.67%
2	AND	Anderston	9,612	11.57%
3	AGS	Argyle Street	8,219	9.89%
4	HNC	Hamilton Central	4,471	5.38%
5	EXG	Exhib Ctr Glasgw	3,162	3.81%
6	HNW	Hamilton West	3,055	3.68%
7	PTK	Partick	1,407	1.69%
8	HYN	Hyndland	1,317	1.59%
9	PYG	Paisley Gil St	722	0.87%
10	HLE	Hillington East	322	0.39%
				94.54%
	Top 20 Destinations			
1	XGG	Glasgow BR	46,240	55.67%
2	AND	Anderston	9,612	11.57%
3	AGS	Argyle Street	8,219	9.89%
4	HNC	Hamilton Central	4,471	5.38%
5	EXG	Exhib Ctr Glasgw	3,162	3.81%
6	HNW	Hamilton West	3,055	3.68%
7	PTK	Partick	1,407	1.69%
8	HYN	Hyndland	1,317	1.59%
9	PYG	Paisley Gil St	722	0.87%
10	HLE	Hillington East	322	0.39%
11	BLT	Blantyre	320	0.39%
12	JOR	Jordanhill	295	0.36%
13	BRR	Barrhead	278	0.33%
14	RUT	Rutherglen	264	0.32%
15	LRH	Larkhall	255	0.31%
16	CTE	Chatelherault	246	0.30%
17	WES	Westerton	245	0.29%
18	CKH	Corkerhill Glas	227	0.27%
19	BLH	Bellshill	221	0.27%
20	DMR	Dalmuir	181	0.22%
				97.59%

Attractor Journeys

Rank	Origin Code	Origin Station	Total	%
	Top Origin			
1	GLC	Glasgow Central	5,498	33.44%
	Top 3 Origins			
1	GLC	Glasgow Central	5,498	33.44%
2	HNC	Hamilton Central	2,185	13.29%
3	AND	Anderston	1,641	9.98%
				56.72%
	Top 5 Origins			
1	GLC	Glasgow Central	5,498	33.44%
2	HNC	Hamilton Central	2,185	13.29%
3	AND	Anderston	1,641	9.98%
4	AGS	Argyle Street	1,618	9.84%
5	XGG	Glasgow BR	1,598	9.72%
				76.28%
	Top 10 Origins			
1	GLC	Glasgow Central	5,498	33.44%
2	HNC	Hamilton Central	2,185	13.29%
3	AND	Anderston	1,641	9.98%
4	AGS	Argyle Street	1,618	9.84%
5	XGG	Glasgow BR	1,598	9.72%
6	HNW	Hamilton West	1,025	6.24%
7	GLQ	Glasgow Queen St	636	3.87%
8	EXG	Exhib Ctr Glasgw	293	1.78%
9	LRH	Larkhall	264	1.61%
10	BLT	Blantyre	238	1.45%
				91.22%
	Top 20 Origins			
1	GLC	Glasgow Central	5,498	33.44%
2	HNC	Hamilton Central	2,185	13.29%
3	AND	Anderston	1,641	9.98%
4	AGS	Argyle Street	1,618	9.84%
5	XGG	Glasgow BR	1,598	9.72%
6	HNW	Hamilton West	1,025	6.24%
7	GLQ	Glasgow Queen St	636	3.87%
8	EXG	Exhib Ctr Glasgw	293	1.78%
9	LRH	Larkhall	264	1.61%
10	BLT	Blantyre	238	1.45%
11	HYN	Hyndland	184	1.12%
12	PTK	Partick	145	0.88%
13	RUT	Rutherglen	139	0.85%
14	NTN	Newton Lanark	119	0.72%
15	SHS	Shotts	90	0.55%
16	BRR	Barrhead	82	0.50%
17	CTE	Chatelherault	73	0.44%
18	CBL	Cambuslang	45	0.27%
19	ANL	Anniesland	38	0.23%
20	TRN	Troon	36	0.22%
				97.01%

Rhoose - CIP

Producer Journeys

Rank	Destination Code	Destination	Total	%
	Top Destination			
1	CDF	Cardiff Central	29,787	29.11%
	Top 3 Destinations			
1	CDF	Cardiff Central	29,787	29.11%
2	CDQ	Cardiff Queen St	18,231	17.81%
3	BGN	Bridgend	11,893	11.62%
				58.54%
	Top 5			
1	CDF	Cardiff Central	29,787	29.11%
2	CDQ	Cardiff Queen St	18,231	17.81%
3	BGN	Bridgend	11,893	11.62%
4	LWM	Llanwit Major	10,751	10.51%
5	BRY	Barry	5,326	5.20%
				74.25%
	Top 10 Destinations			
1	CDF	Cardiff Central	29,787	29.11%
2	CDQ	Cardiff Queen St	18,231	17.81%
3	BGN	Bridgend	11,893	11.62%
4	LWM	Llanwit Major	10,751	10.51%
5	BRY	Barry	5,326	5.20%
6	BYD	Barry Docks	4,317	4.22%
7	CYS	Cathays	3,209	3.14%
8	SWA	Swansea	2,769	2.71%
9	CGN	Cogan	2,166	2.12%
10	CAD	Cadoxton	1,838	1.80%
				88.22%
	Top 20 Destinations			
1	CDF	Cardiff Central	29,787	29.11%
2	CDQ	Cardiff Queen St	18,231	17.81%
3	BGN	Bridgend	11,893	11.62%
4	LWM	Llanwit Major	10,751	10.51%
5	BRY	Barry	5,326	5.20%
6	BYD	Barry Docks	4,317	4.22%
7	CYS	Cathays	3,209	3.14%
8	SWA	Swansea	2,769	2.71%
9	CGN	Cogan	2,166	2.12%
10	CAD	Cadoxton	1,838	1.80%
11	CDB	Cardiff Bay	1,128	1.10%
12	TRF	Trefforest	1,075	1.05%
13	GTN	Grangetown Glam	717	0.70%
14	NTH	Neath	513	0.50%
15	HHL	Heath High Level	488	0.48%
16	NWP	Newport Gwent	464	0.45%
17	DNS	Dinas Powys	445	0.43%
18	PPD	Pontypridd	441	0.43%
19	TGS	Ty Glas	393	0.38%
20	EBK	Eastbrook	375	0.37%
				94.12%

Attractor Journeys

Rank	Origin Code	Origin Station	Total	%
	Top Origin			
1	CDF	Cardiff Central	10,226	16.89%
	Top 3 Origins			
1	CDF	Cardiff Central	10,226	16.89%
2	BRY	Barry	7,990	13.20%
3	LWM	Llanwit Major	6,382	10.54%
				40.62%
	Top 5 Origins			
1	CDF	Cardiff Central	10,226	16.89%
2	BRY	Barry	7,990	13.20%
3	LWM	Llanwit Major	6,382	10.54%
4	BGN	Bridgend	4,932	8.15%
5	BYD	Barry Docks	3,723	6.15%
				54.92%
	Top 10 Origins			
1	CDF	Cardiff Central	10,226	16.89%
2	BRY	Barry	7,990	13.20%
3	LWM	Llanwit Major	6,382	10.54%
4	BGN	Bridgend	4,932	8.15%
5	BYD	Barry Docks	3,723	6.15%
6	CDQ	Cardiff Queen St	3,485	5.76%
7	CAD	Cadoxton	3,389	5.60%
8	SWA	Swansea	2,821	4.66%
9	CGN	Cogan	1,671	2.76%
10	CYS	Cathays	1,346	2.22%
				75.91%
	Top 20 Origins			
1	CDF	Cardiff Central	10,226	16.89%
2	BRY	Barry	7,990	13.20%
3	LWM	Llanwit Major	6,382	10.54%
4	BGN	Bridgend	4,932	8.15%
5	BYD	Barry Docks	3,723	6.15%
6	CDQ	Cardiff Queen St	3,485	5.76%
7	CAD	Cadoxton	3,389	5.60%
8	SWA	Swansea	2,821	4.66%
9	CGN	Cogan	1,671	2.76%
10	CYS	Cathays	1,346	2.22%
11	PPD	Pontypridd	1,054	1.74%
12	EBK	Eastbrook	996	1.64%
13	DNS	Dinas Powys	959	1.58%
14	TRF	Trefforest	872	1.44%
15	LLN	Llandaf	789	1.30%
16	BYI	Barry Island	700	1.16%
17	CMN	Carmarthen	622	1.03%
18	PEN	Penarth	592	0.98%
19	NWP	Newport Gwent	530	0.88%
20	RDR	Radyr	418	0.69%
				88.35%

East Midlands Parkway

Producer Journeys

Rank	Destination Code	Destination	Total	%
	Top Destination			
1	XLD	London BR	13,037	58.78%
	Top 3 Destinations			
1	XLD	London BR	13,037	58.78%
2	NOT	Nottingham	2,237	10.09%
3	LEI	Leicester	2,221	10.01%
				78.88%
	Top 5			
1	XLD	London BR	13,037	58.78%
2	NOT	Nottingham	2,237	10.09%
3	LEI	Leicester	2,221	10.01%
4	XUA	London Travelcard	1,457	6.57%
5	DBY	Derby	494	2.23%
				87.67%
	Top 10 Destinations			
1	XLD	London BR	13,037	58.78%
2	NOT	Nottingham	2,237	10.09%
3	LEI	Leicester	2,221	10.01%
4	XUA	London Travelcard	1,457	6.57%
5	DBY	Derby	494	2.23%
6	LCN	Lincoln Central	218	0.98%
7	XBH	Birmingham BR	208	0.94%
8	LBO	Loughboro Leics	177	0.80%
9	SHF	Sheffield	124	0.56%
10	BEE	Beeston	114	0.51%
				91.47%
	Top 20 Destinations			
1	XLD	London BR	13,037	58.78%
2	NOT	Nottingham	2,237	10.09%
3	LEI	Leicester	2,221	10.01%
4	XUA	London Travelcard	1,457	6.57%
5	DBY	Derby	494	2.23%
6	LCN	Lincoln Central	218	0.98%
7	XBH	Birmingham BR	208	0.94%
8	LBO	Loughboro Leics	177	0.80%
9	SHF	Sheffield	124	0.56%
10	BEE	Beeston	114	0.51%
11	XZA	London Travelcard	89	0.40%
12	LGE	Long Eaton	86	0.39%
13	XCN	Croydon BR	83	0.37%
14	SYS	Syston	60	0.27%
15	XMC	Manchester BR	59	0.27%
16	MHR	Market Harboro	49	0.22%
17	LTN	LutonAirportPwy	46	0.21%
18	PBO	Peterborough	43	0.19%
19	GRA	Grantham	40	0.18%
20	GTW	Gatwick Airport	35	0.16%
				94.13%

Attractor Journeys

Rank	Origin Code	Origin Station	Total	%
	Top Origin			
1	XLD	London BR	6,977	59.68%
	Top 3 Origins			
1	XLD	London BR	6,977	59.68%
2	NOT	Nottingham	1,196	10.23%
3	LEI	Leicester	457	3.91%
				73.82%
	Top 5 Origins			
1	XLD	London BR	6,977	59.68%
2	NOT	Nottingham	1,196	10.23%
3	LEI	Leicester	457	3.91%
4	LBO	Loughboro Leics	378	3.23%
5	DBY	Derby	326	2.79%
				79.84%
	Top 10 Origins			
1	XLD	London BR	6,977	59.68%
2	NOT	Nottingham	1,196	10.23%
3	LEI	Leicester	457	3.91%
4	LBO	Loughboro Leics	378	3.23%
5	DBY	Derby	326	2.79%
6	LCN	Lincoln Central	204	1.74%
7	SHF	Sheffield	198	1.69%
8	LGE	Long Eaton	135	1.15%
9	XUA	London Travelcard	129	1.10%
10	BEE	Beeston	96	0.82%
				86.36%
	Top 20 Origins			
1	XLD	London BR	6,977	59.68%
2	NOT	Nottingham	1,196	10.23%
3	LEI	Leicester	457	3.91%
4	LBO	Loughboro Leics	378	3.23%
5	DBY	Derby	326	2.79%
6	LCN	Lincoln Central	204	1.74%
7	SHF	Sheffield	198	1.69%
8	LGE	Long Eaton	135	1.15%
9	XUA	London Travelcard	129	1.10%
10	BEE	Beeston	96	0.82%
11	BHM	Birmingham N St	83	0.71%
12	MHR	Market Harboro	76	0.65%
13	HUL	Hull	65	0.56%
14	YRK	York	54	0.46%
15	KET	Kettering	53	0.45%
16	XNW	Newark BR	48	0.41%
17	LDS	Leeds	45	0.38%
18	XBH	Birmingham BR	44	0.38%
19	GRA	Grantham	41	0.35%
20	LTN	LutonAirportPwy	37	0.32%
				91.03%

Liverpool South Parkway

Producer Journeys

Rank	Destination Code	Destination	Total	%
	Top Destination			
1	XLP	Liverpool BR	281,802	61.03%
	Top 3 Destinations			
1	XLP	Liverpool BR	281,802	61.03%
2	XMC	Manchester BR	29,380	6.36%
3	SOP	Southport	12,770	2.77%
				70.16%
	Top 5			
1	XLP	Liverpool BR	281,802	61.03%
2	XMC	Manchester BR	29,380	6.36%
3	SOP	Southport	12,770	2.77%
4	XWR	Warrington BR	8,866	1.92%
5	HNX	Hunts Cross	7,944	1.72%
				73.80%
	Top 10 Destinations			
1	XLP	Liverpool BR	281,802	61.03%
2	XMC	Manchester BR	29,380	6.36%
3	SOP	Southport	12,770	2.77%
4	XWR	Warrington BR	8,866	1.92%
5	HNX	Hunts Cross	7,944	1.72%
6	BRW	Brunswick	7,132	1.54%
7	CRE	Crewe	6,169	1.34%
8	XBH	Birmingham BR	5,927	1.28%
9	BNW	Bootle N Strand	5,390	1.17%
10	AIG	Aigburth	4,739	1.03%
				80.16%
	Top 20 Destinations			
1	XLP	Liverpool BR	281,802	61.03%
2	XMC	Manchester BR	29,380	6.36%
3	SOP	Southport	12,770	2.77%
4	XWR	Warrington BR	8,866	1.92%
5	HNX	Hunts Cross	7,944	1.72%
6	BRW	Brunswick	7,132	1.54%
7	CRE	Crewe	6,169	1.34%
8	XBH	Birmingham BR	5,927	1.28%
9	BNW	Bootle N Strand	5,390	1.17%
10	AIG	Aigburth	4,739	1.03%
11	BKQ	Birkenhead H Sq	4,098	0.89%
12	STM	St Michaels	4,043	0.88%
13	CTR	Chester	3,757	0.81%
14	RUN	Runcorn	3,626	0.79%
15	WLO	Waterloo Mersey	2,991	0.65%
16	CNP	Conway Park	2,754	0.60%
17	BWD	Birchwood	2,717	0.59%
18	BAH	Bank Hall	2,306	0.50%
19	BLN	Blundellsands	2,197	0.48%
20	FBY	Formby	2,193	0.47%
				86.81%

Attractor Journeys

Rank	Origin Code	Origin Station	Total	%
	Top Origin			
1	LVC	Liverpool Ctl	14,912	13.92%
	Top 3 Origins			
1	LVC	Liverpool Ctl	14,912	13.92%
2	HNX	Hunts Cross	7,439	6.94%
3	XLP	Liverpool BR	5,694	5.31%
				26.17%
	Top 5 Origins			
1	LVC	Liverpool Ctl	14,912	13.92%
2	HNX	Hunts Cross	7,439	6.94%
3	XLP	Liverpool BR	5,694	5.31%
4	MRF	Moorfields	5,455	5.09%
5	XWR	Warrington BR	4,040	3.77%
				35.03%
	Top 10 Origins			
1	LVC	Liverpool Ctl	14,912	13.92%
2	HNX	Hunts Cross	7,439	6.94%
3	XLP	Liverpool BR	5,694	5.31%
4	MRF	Moorfields	5,455	5.09%
5	XWR	Warrington BR	4,040	3.77%
6	BRW	Brunswick	3,955	3.69%
7	STM	St Michaels	3,695	3.45%
8	LIV	Liverpool L St	3,042	2.84%
9	CRE	Crewe	2,823	2.63%
10	MCO	Manchester O Rd	2,165	2.02%
				49.67%
	Top 20 Origins			
1	LVC	Liverpool Ctl	14,912	13.92%
2	HNX	Hunts Cross	7,439	6.94%
3	XLP	Liverpool BR	5,694	5.31%
4	MRF	Moorfields	5,455	5.09%
5	XWR	Warrington BR	4,040	3.77%
6	BRW	Brunswick	3,955	3.69%
7	STM	St Michaels	3,695	3.45%
8	LIV	Liverpool L St	3,042	2.84%
9	CRE	Crewe	2,823	2.63%
10	MCO	Manchester O Rd	2,165	2.02%
11	WLO	Waterloo Mersey	1,783	1.66%
12	RUN	Runcorn	1,623	1.51%
13	BNW	Bootle N Strand	1,596	1.49%
14	HTF	Hartford	1,586	1.48%
15	SOP	Southport	1,354	1.26%
16	BLN	Blundellsands	1,315	1.23%
17	SFL	Seaforth & Lithd	1,243	1.16%
18	AIG	Aigburth	1,232	1.15%
19	FBY	Formby	1,176	1.10%
20	MAN	Manchester Pic	1,148	1.07%
				62.78%

Ebbw Vale Parkway

Producer Journeys

Rank	Destination Code	Destination	Total	%
	Top Destination			
1	CDF	Cardiff Central	185,846	85.37%
	Top 3 Destinations			
1	CDF	Cardiff Central	185,846	85.37%
2	CDQ	Cardiff Queen St	9,438	4.34%
3	CKY	Crosskeys	3,095	1.42%
				91.13%
	Top 5			
1	CDF	Cardiff Central	185,846	85.37%
2	CDQ	Cardiff Queen St	9,438	4.34%
3	CKY	Crosskeys	3,095	1.42%
4	CDB	Cardiff Bay	2,987	1.37%
5	NBE	Newbridge	2,004	0.92%
				93.42%
	Top 10 Destinations			
1	CDF	Cardiff Central	185,846	85.37%
2	CDQ	Cardiff Queen St	9,438	4.34%
3	CKY	Crosskeys	3,095	1.42%
4	CDB	Cardiff Bay	2,987	1.37%
5	NBE	Newbridge	2,004	0.92%
6	BYI	Barry Island	1,946	0.89%
7	ROR	Rogerstone	1,754	0.81%
8	LTH	Llanhilleth	1,387	0.64%
9	CYS	Cathays	1,092	0.50%
10	RCA	Risca & Pontymiste	892	0.41%
				96.67%
	Top 20 Destinations			
1	CDF	Cardiff Central	185,846	85.37%
2	CDQ	Cardiff Queen St	9,438	4.34%
3	CKY	Crosskeys	3,095	1.42%
4	CDB	Cardiff Bay	2,987	1.37%
5	NBE	Newbridge	2,004	0.92%
6	BYI	Barry Island	1,946	0.89%
7	ROR	Rogerstone	1,754	0.81%
8	LTH	Llanhilleth	1,387	0.64%
9	CYS	Cathays	1,092	0.50%
10	RCA	Risca & Pontymiste	892	0.41%
11	BGN	Bridgend	700	0.32%
12	BRI	Bristol Temple M	484	0.22%
13	XLD	London BR	480	0.22%
14	BRY	Barry	393	0.18%
15	BYD	Barry Docks	387	0.18%
16	NNP	Ninian Park	339	0.16%
17	SWA	Swansea	327	0.15%
18	NWP	Newport Gwent	292	0.13%
19	CAD	Cadoxton	291	0.13%
20	PEN	Penarth	256	0.12%
				98.48%

Attractor Journeys

Rank	Origin Code	Origin Station	Total	%
	Top Origin			
1	CDF	Cardiff Central	15,492	44.34%
	Top 3 Origins			
1	CDF	Cardiff Central	15,492	44.34%
2	ROR	Rogerstone	2,598	7.43%
3	RCA	Risca & Pontymiste	2,434	6.97%
				58.74%
	Top 5 Origins			
1	CDF	Cardiff Central	15,492	44.34%
2	ROR	Rogerstone	2,598	7.43%
3	RCA	Risca & Pontymiste	2,434	6.97%
4	NBE	Newbridge	2,389	6.84%
5	LTH	Llanhilleth	1,902	5.44%
				71.02%
	Top 10 Origins			
1	CDF	Cardiff Central	15,492	44.34%
2	ROR	Rogerstone	2,598	7.43%
3	RCA	Risca & Pontymiste	2,434	6.97%
4	NBE	Newbridge	2,389	6.84%
5	LTH	Llanhilleth	1,902	5.44%
6	CDQ	Cardiff Queen St	1,403	4.02%
7	BGN	Bridgend	1,286	3.68%
8	CKY	Crosskeys	1,153	3.30%
9	NWP	Newport Gwent	543	1.55%
10	RHY	Rhymney	356	1.02%
				84.58%
	Top 20 Origins			
1	CDF	Cardiff Central	15,492	44.34%
2	ROR	Rogerstone	2,598	7.43%
3	RCA	Risca & Pontymiste	2,434	6.97%
4	NBE	Newbridge	2,389	6.84%
5	LTH	Llanhilleth	1,902	5.44%
6	CDQ	Cardiff Queen St	1,403	4.02%
7	BGN	Bridgend	1,286	3.68%
8	CKY	Crosskeys	1,153	3.30%
9	NWP	Newport Gwent	543	1.55%
10	RHY	Rhymney	356	1.02%
11	XLD	London BR	298	0.85%
12	BRI	Bristol Temple M	292	0.84%
13	SWA	Swansea	280	0.80%
14	PEN	Penarth	280	0.80%
15	CYS	Cathays	277	0.79%
16	CNM	Cheltenham Spa	268	0.77%
17	CDB	Cardiff Bay	249	0.71%
18	CAD	Cadoxton	176	0.50%
19	PGM	Pengam	147	0.42%
20	CPH	Caerphilly	142	0.41%
				91.48%

APPENDIX

C

NEW STATIONS DEMAND FORECASTING CHECKLIST

Demand Side

What are the main markets (demand generators) that would be served by the station?

For example is the station predominantly to serve local housing, to provide access to local employment or leisure opportunities, or will it be a park and ride or parkway station?

If it is expected that any new station is likely to serve more than one market, demand and revenue forecasts for each market should be provided.

- Description of the volume of local housing and where it is located.
- Where does the location look to for jobs/ amenities etc?
- How likely to happen are any proposals for new housing/employment?

Promoters should remember to estimate the demand generated through the attraction of trips from other stations to the new station, with proportionality in mind. Where promoters believe that this is not relevant, the reasons should be explained.

What is the expected source of demand from the new station in terms of trip generation, mode switch (from which modes?) and abstraction from existing stations?

Will stopping services at the new station result in longer journey times for existing users, with resulting in an associated loss of demand. How is this quantified?

What rail demand underlying growth is forecast (and hence growth in demand at the new station)?

- What is the rationale for the choice of growth forecast? How does they compare with TEMPRO/RUS/local forecasts.
- What assumptions are made about the number of new houses / jobs in the area and to what timeframe
- Where there is explicit new housing associated with the station how is this compensated for in overall growth?
- What are the associated risks with the points mentioned above? What sensitivity analysis has been carried out around these issues, i.e. housing or shopping centre not built, or not built on time?

What other factors (eg housing or business park developments, local airport passenger throughput) influence the demand at the new station?

- Promoters should provide a full list, and note whether each factor has been included in the forecasting methodology used. Promoters should also indicate which factors are within their control and which are not.

Supply Side

What rail service pattern (in terms of train frequency, journey time to key destinations) and fares have been assumed when preparing the demand forecasts.

- What evidence is there that the proposed train service at the new station will take people where they want to go and when they need to get there?
- How does the rail service pattern differ from the current timetable (or the committed future timetable)?
- How much confidence is there in that the service pattern can be delivered?
- If there is uncertainty about the train service that will serve the station then sensitivity tests of demand, revenue (and costs) should be undertaken.
- Does the new service pattern need new infrastructure, rolling stock or staff etc?
- How sensitive are the demand forecasts to changes in frequency, journey time and service calling points?

Describe the proposed accessibility of the station.

- This includes car parking provision (car park capacity and cost) and bus service frequency and locations served.

What assumptions about other (competing) modes have been made?

- Promoters should consider the attractiveness of the station compared to other modes, with the approach to demand forecasting reflecting this.
- What are the assumptions made about changes in other transport modes, for example road congestion and bus competition?

What is the current performance of rail services through the station (or affected by it)? Is there crowding or under utilisation of train capacity, any current performance issues or issues with car park utilisation at neighbouring stations?

Forecasting Methodology and Presentation of KPIs

What approach (methodology) has been used to forecast demand for the station and upon what is it based?

Where an existing demand model has been used, demonstrate that it is suitable for forecasting the demand for a new station.

- What segmentation of demand has been applied (journey purpose/socio-economic/ticket type)?
- Where trip rates are used, what are they and how do they compare with TEMPRO?
- Where the new station will serve a new housing, business or leisure development the promoter should estimate rail demand from the new housing in the absence of the new station (and include these in the Do Minimum)
- How has abstracted demand been forecast?
- What is the expected profile of demand during the day/week?
- How has demand been annualised?
- What build-up assumptions have been applied to the forecasts and upon what are they based?

How has revenue been forecast?

- How have average yields been calculated and how do they compare with published fares?
- How are PTE tickets etc dealt with?
- Has revenue by TOC as well as UK rail revenue been forecast

Demand and revenue forecasts should be reported in terms of passenger journeys produced by and attracted to the station each financial year (April – March). This is to facilitate the evaluation of the proposal by DfT.

- Where there is transfer of demand (and passenger revenue) between TOCs, demand and revenue impacts should be presented by TOC.
- If possible these forecasts should be disaggregated by different drivers (eg existing housing, new housing) where relevant.

Other Issues

What are the risks to the demand and revenue forecasts? Promoters are asked to identify the risks and indicate the impact they could have on demand and revenue.

Provision of information to support the submission. The promoter provide a copy of the supporting demand forecasting documentation to DfT and TS. This should include a description of all assumptions used to prepare the demand forecasts, a full description of the demand methodologies used and parameters used in the demand modelling.

The promoter should retain a copy of a functional version of the forecasting model(s) and associated documentation. The model should represent the forecasts used in the final submission for the new station. The demand forecasting models and associated documentation should be prepared in a form that could be readily provided to DfT or TS.

Promoters should take responsibility for the review of the success of new stations (in terms of the level of patronage). This is consistent with HM Treasury guidance on public funding of schemes which requires post-implementation evaluation of investments.

CONTROL SHEET

Project/Proposal Name	Station Usage and Demand Forecast for Newly Opened Railway Lines and Stations
Document Title	Draft Final Report
Client Contract/Project No.	
SDG Project/Proposal No.	222273

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REVIEW

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